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FIFTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF NEW HAMPSHIRE

FOR THE LIBRARY

Fiscal Year Ending April 30, 1886.

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28754

GENERAL REPORT.

To His Excellency the Governor and the Honorable Council:

Herewith is presented the fifth annual report of the State Board of Health, for the year ending April 30, 1886. Like the preceding reports issued by the board, it is made up chiefly for the purpose of giving information to the people of the state upon various subjects regarding and associated with the ever important question of health. The matter which comprises this volume is given in plain language. Scientific abstractions and technical terms are avoided as far as possible. The work is for the people, to convey knowledge that may be understood by all.

A comparatively small part of the executive work of the board is represented, because the space that would be taken up by such a recital is of more value for other subjects. In most cases such work has been of a local nature and not interesting to the general public; there have been, however, occasional exceptions to this rule.

TYPHOID FEVER.

In another place will be found a report upon this disease from the physicians in different parts of the state. The disease has gradually diminished during the last three years, and several physicians have expressed the conviction that it is due entirely to an increased knowledge among the people of the various causes of typhoid, and a correspondingly better understanding of some of the means of avoiding it. An intelligent physician in the western part of the state, who has been in active practice for many years, in writing to the board concerning sanitary work, says: "In the last three years typhoid fever has become almost extinct. I do not have one case now in the time I used to have five cases four or five years ago. I firmly believe that these results can be mainly attributed to the improved sanitary conditions which have taken place in all parts of the state. The money expended by our legislature has been well invested, and the people who pay the taxes have received fully fifty per cent upon the money invested. But to us physicians, financially, it is like the old adage: 'What was fun for the boys was death to the frogs;' so in this case, what is a famished pocket-book to the doctors is health and comfort to the people." This quotation shows very pointedly to what extent many physicians labor daily for the public good against their own financial interests, as has the writer of the above. Increased attention has been given the subject of drinking-water, as it has been shown each year that polluted water and filth of all kinds are a prolific source of this and kindred diseases. As one of the fruits of this information, local boards of health have been created and more or less sanitary work has been done in towns that have never before taken any official action in this direction. The water supply has been examined, or analyzed, in hundreds of individual cases during the past three years, and those shown to be contaminated have been abandoned, the latter being mostly from wells polluted from privies, cesspools, sink-drains, barnyards, etc.

The gratifying results that have been accomplished in this direction may be still further increased by vigilant attention to the evils that are already positively known to be productive of this filthy disease, which annually destroys so many valuable lives.

DIPHTHERIA.

This erratic disease has existed in several localities in the state during the year. Reference to the secretary's report will show quite fully its prevalence, as well as the causes, or supposed causes, in many instances. It has long been classed among the filth diseases. In this state as well as elsewhere it is more generally found among the poorer class and in the more unsanitary parts of towns and villages. Like typhoid, it prevails to a greater extent in small villages and at isolated farmhouses than in the cities or larger towns. That telluric and atmospheric conditions have, in connection with other causes, a marked effect upon this disease is evident from its history, and when the spark has been ignited, assists in fanning it into an epidemic. That it is both infectious and contagious is a fact no longer open to discussion. To limit its spread, after it has appeared in a locality, as much care should be exercised as in any other contagious disease.

No epidemics of any considerable extent have occurred during the year; that at Newmarket was the severest. The disease has been reported as existing in many localities of this and foreign countries during the present year, evidently in excess of the preceding. Whether there are some general influences springing up to favor its reappearance in the form of epidemics we are not able to say; there are some evidences, however, to indicate it, hence a special effort should be made by every family to avoid those conditions of sanitary neglect, which extend to this and other diseases a most cordial welcome.

SCARLET FEVER.

The prevalence of this disease has been somewhat less than for the year 1884, although its ratio of fatality is somewhat larger. It has generally existed in a very mild form, yet each year it is a dreaded destroyer among us, against which isolation, disinfection, and all other available precautions should be employed. The percentage of its fatality, however small, cannot indicate from what household its victims may be called; its mildness should not cause any relaxation in restrictive measures, for it often appears in malignant form where least expected. It should be guarded against by every family with as much vigor as would be exercised against the most dreaded disease.

A report from seventy-six towns, giving some idea of the extent to which it has prevailed and the ratio of mortality, will be found elsewhere.

SMALL-POX.

The epidemic of small-pox in Montreal called upon the board to exercise its powers and functions to an extent not before demanded since the creation of the department, and in this one time of needed protection the value of the department was most vividly apparent to the people of the state. Indeed, the absence of any national health organization, in which local or state authorities can place confidence, makes it incumbent upon the latter to use the utmost vigilance in their respective jurisdictions to prevent the invasion of epidemics.

The United States Marine Hospital Service undertook, on behalf of the government, to restrict the importation of small-pox into the states by placing inspectors upon all the trains coming from Montreal. For several weeks after the inauguration of this inspection service, the work was so inefficiently performed that we, unwilling to jeopardize the interests of our state, especially of the manufacturing centers, established an inspection service in behalf of the state. Not only this, but we used every effort possible to secure a better government service, that we might be able to withdraw our own and obtain better protection for all New England.

While we were, at least, exceedingly fortunate in the results, it is no less to be regretted that the national government should place interests so important as the restriction of epidemics in the hands of a bureau possessing so few of the requisites for guarding the public health as, in our judgment, belongs to the Marine Hospital Service.

But six cases of small-pox occurred in this state, and those were in one family, three fatal. A more complete account of this work will be found in the report of the secretary.

CHOLERA.

The country was exceedingly fortunate during the year to escape a visitation of this dreaded disease, which was expected by many. The disease was restricted only through the intelligent, determined, and systematic work done by the health authorities of foreign ports and places. The number of cases officially reported in Spain up to the first of November last, was 273,808; the number of deaths 101,448. This, although enormous, is believed to be below the actual number. Had it not been for intelligent sanitation and other protective measures, such an epidemic would have carried the disease over the greater part of the civilized world. We cannot, however, regard our country as safe from the invasion of the disease, even though we have escaped thus far, so long as it lingers in Spain and France. Neither can we feel that the sanitary condition of our great, and for that matter small, cities is sufficiently good to warrant our relying upon such grounds for exemption; not only should vigilant sanitary work be done each year and all the time, but every health organization and municipal government should be ready promptly to isolate in the most thorough manner the first case that may appear. An efficient sanitary organization which makes ready beforehand and keeps the sanitary condition of its jurisdiction up to the highest attainable point of cleanliness, sustaining a constant system of inspections, and guarding the water supply against pollution, places an almost impregnable barrier before the invasion of cholera. Such work not only fortifies a place against such a disease as the one under consideration, but it lessens the death rate from other diseases, which in the aggregate destroy more lives than all of our epidemics. The increased state and municipal expenditures, that follow the fright of any threatened epidemic, saves, no doubt, many valuable lives that would otherwise have been victims of some other form of filth disease.

The liability of cholera in this state, while much less than that of many others, is not beyond the limit of possibilities, and the action of the last legislature in establishing a fund to meet any such contingency was a wise one.

THE SCHOOLHOUSES OF THE STATE.

The board has given considerable attention to the sanitary and hygienic construction and condition of our schoolhouses. The manner in which this work has been carried out may be seen by reference to the paper upon the "Schoolhouses of Merrimack County," elsewhere given in this report. A sanitary survey has been received of some fifteen hundred schoolhouses throughout the state.

Facts enough have been obtained to show that in a very great majority of districts, hygienic principles were entirely overlooked or ignored in the construction of the houses, and that there is a lamentable neglect to exercise ordinary oversight, and in some cases decency, in caring for the buildings.

It may be justly said in many cases that structural defects cannot be easily remedied; but there can be no extenuating excuses offered for the disgusting, unsightly, disease-producing privies, or other equally dangerous nuisances, that are to be found in some districts. Still less can be said in defense of the district policy that entirely ignores the natural requirements of the pupils and provides no conveniences whatever! In an age like this, characterized by its intense brain activity, by a cramming educational system that hurries through the multiplicity of studies and accomplishments composing the school curriculum in the shortest possible time, the physical demands are proportionally greater, and cannot with impunity be neglected. The pupil must be provided with all the essentials of perfect health, that the delicate and sensitive machine may not be broken down by an unequal strain. Good ventilation, proper light, unpolluted water, cleanly grounds, etc., are necessary adjuncts to every school, large or small.

Under the town system adopted by the last legislature, we hope to see these subjects given their proper attention, — at least that they will receive much more consideration than has been given them under the old district system.

Boards of education should recognize that they have some responsibilities resting upon them much more grave than the simple hiring of teachers and maintaining a certain number of weeks' schooling in a given locality. In the building of new houses they should be held responsible for the proper construction of the same in accordance with the most advanced principles. It costs no more to build a house properly than it does to erect a structure with no regard for the health of its occupants. Even if it did, a few dollars should not be spared when health, and even life itself, is jeopardized by such "economy."

Some legislation is needed to prevent the building of schoolhouses without conforming to certain regulations necessary to insure ample provision for ventilating, heating, lighting, etc. The state should furnish proper plans to every board of education, or other authority having charge of the construction of such houses, for such a house as the locality might demand, the expense, of course, to be left to the town or city in which the house is to be located. Such a course we believe would be of great advantage to the welfare of the pupils, as well as economical for the town.

The whole subject will be more fully discussed when the schoolhouse survey for the state has been completed.

SANITARY INSPECTIONS OF PUBLIC RESORTS AND SUMMER HOTELS.

A considerable number of the larger hotels have been inspected during the year, and many suggestions given to remedy existing defects, more particularly in respect to drainage and water supply. The courtesy with which suggestions of this character have been received indicates a strong desire on the part of the proprietors or owners to place their buildings in as healthful a condition as possible. In a few individual cases several thousand dollars have been expended to secure this end, and appreciative summer tourists are quick to recognize these improvements, for such houses, other things being equal, will receive their patronage.

No hotel proprietor dependent upon summer travel can long fill his house without the closest attention to all the sanitary requirements. He may be able, by exterior and surface appearances, to do so for a while, but broken drains, cesspools saturating the soil, foul vaults threatening the water supply with pollution, and like defects, will sooner or later ruin his business; this has been demonstrated in our own state. A single outbreak of any of the filth diseases is ruinous, and with neglect it is sure to come.

This fact is so generally understood by those having money invested in the business that it is not usually difficult to secure such improvements as are actually required to obtain good sanitary appointments.

The best supply of water can, of course, be obtained in the mountain region, while in some localities along the coast it is difficult to secure. Shallow wells as a rule should be condemned on account of their great liability to pollution. Only a few such were found in the several inspections made. It can be said that, with a very few exceptions, the summer hotels in New Hampshire are in a first-class sanitary condition. The very few cases of zymotic disease that have been recorded during the last few years among our summer visitors, are sufficient evidence of this fact.

The sanitary inspections of our places of public resort will be annually followed as far as practicable.

SANITARY INSPECTION OF RAILWAY STATIONS AND GROUNDS.

During the year, the president and secretary of the board have inspected the stations and grounds of several of the railroads in the state. The work will be continued the present season. As a whole, the general condition of the stations and grounds of the various lines, from a hygienic standpoint, are good; indeed, it may be said much better than was anticipated. The evidence is strong that a very marked improvement in the sanitary appointments of the railroads of this state has taken place within a few years, and at the rate of the last two or three, the time cannot be far distant when the conditions will be above criticism, so far as the corporations are concerned. All railroads should hold their local agents responsible for any failure to maintain the best hygienic appointments and scrupulous cleanliness after the structural requirements and necessary facilities have been provided by the corporation.

The general appreciation of the importance of the subject by the several railroads of the state is by no means inconsiderable. From every point of view, a good sanitary administration is economy for the corporation.

NUISANCES.

Quite a large number of complaints of nuisances have been received during the year. In some cases the board has made a direct investigation of the cause of complaint, and acted executively in the matter; others have been referred to the local board of health, and by the latter disposed of in a prompt manner, as a rule.

No complaint has been ignored, but has received the attention its importance merited.

A few instances of this kind will be found in the secretary's report. The law passed last session, chapter 14, Pamphlet Laws, 1885, has increased the executive powers of the board, so that it is now able to promptly handle any complaint that may be presented, if applicable to the public health, in a much more satisfactory manner than formerly.

All such complaints should, however, be first presented to the local board of health, and then if not acted upon in due time, the case may be presented to this board.

Local boards may apply to the state board at any time for advice in any specified case, which will be given promptly in every instance.

SANITARY LEGISLATION.

The last legislature enacted some laws tending to secure a better sanitary administration than has heretofore existed. It invested the state board of health with increased powers, and provided for the creation of local boards by appointment, if not elected.

The wisdom of the legislature in placing upon our statutes additional laws for the protection of the health of the people is to be commended; the subject should be looked upon with as much consideration as is given to the care of property, or the fostering of productive industries. Indeed, as the accumulation of property and the prosperity of every industry are dependent very largely upon the status of the public health, the latter should be a primary consideration with the law makers of every commonwealth.

The idea should be grasped by every community and every family that public health means much more than is literally expressed by the term. In attaining a high standard of public health, there are other results greater than the cleaning of a street or the building of a sewer; intellectual, moral, and physical energies are created, which in themselves bear the fruits of happiness and longevity; the comprehension is expanded, and the higher and nobler purposes of life are better seen and appreciated. Sanitary work, besides its bearing upon our physical existence, is a powerful educator. It is to be expected, then, that the legislature will make from year to year such additional sanitary laws as experience may demand for the good of the people.

The laws of last session, bearing upon this subject, will be found in the appendix.

SECRETARY'S REPORT.

TYPHOID FEVER AND DIPHTHERIA.*

In the following reports from physicians in different parts of the state, will be found evidence similar in character to that presented in our reports for the last three years. Year after year the fact is demonstrated that typhoid fever and diphtheria are largely filth diseases, hence are preventable. When physicians repeatedly give this as their pronounced opinion, based upon the most careful observations, and in some instances upon corroborative evidence, doubt should no longer prevail. We are pleased to receive the assurances of some physicians, that owing to sanitary precautions in their respective localities these diseases, especially typhoid fever, have greatly diminished within three or four years, which is another proof that they can, in a measure, be avoided.

Alstead—S. T. SMITH, M. D.

Typhoid Fever.—One case in my practice.
Diphtheria.—One case.

Amherst—J. B. PETTENGILL, M. D.

Typhoid Fever.—None in my practice. One case was reported, but recovered in two weeks. I doubt if there has been a case in town during the year. Attribute the cause of the disease to bad sewerage and filth.

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* Several reports were received from physicians who neglected to give their names or residences; such reports have been omitted. A few were received too late for insertion in this report.

Diphtheria.—None in my practice. A number of fatal cases occurred in Milford. Consider filth and bad water the most common sources of the disease.

Amherst—H. D. Hicks, M. D.

Typhoid Fever.—One case, not fatal. Attribute the cause in this case to debility and overwork.

Diphtheria.—None observed.

Andover—Henry A. Weymouth, M. D.

Typhoid Fever.—None in my practice.

Diphtheria.—Two cases, recovered. Could detect nothing unsanitary in the surroundings.

Antrim—I. G. Anthoine, M. D.

Typhoid Fever.—Three cases, none fatal; two in town. In one case the drinking-water was contaminated. Think the disease is caused by bad drinking-water and unsanitary surroundings.

Diphtheria.—One case, not fatal. I generally find bad drinking-water, or bad surroundings, or both, in connection with this disease; but sometimes neither.

Barrington—William Waterhouse, M. D.

Typhoid Fever.—One case, fatal. Attributed the case to overexertion and extra cares; could not account for the origin of the fever poison.

Diphtheria.—One case, severe, recovered. In a country town, such as Barrington, the most probable cause of this disease may be from water polluted by fluids from sink-spouts, and soapsuds which are poured upon the ground about the farmhouses and eventually find their way into the wells.

Belmont—S. A. Merrill, M. D.

Typhoid Fever.—One case, recovered.

Diphtheria.—None observed.

Bristol—J. M. Bishop, M. D.

Typhoid Fever.—One case, recovered. The disease was contracted in Providence, R. I., and the patient was sick two weeks before coming here.

Diphtheria.—None observed. Have had cases of diphtheritic sore throat and tonsilitis.

Bristol—H. B. Fowler, M. D.

Typhoid Fever.—Not one. Have known of none in town. Attribute the cause of this disease to a germ poison.

Diphtheria.—None in my practice, none in town to my knowledge. Consider the source of the disease to be the same as in typhoid fever. It has really taken the place of the latter.

Bristol—John C. Wheet, M. D.

Typhoid Fever.—None in my practice.

Diphtheria.—Three cases, none fatal, one in Alexandria.

Campton Village—William A. Smith, M. D.

Typhoid Fever.—Not one; think we have not had a single case in town.

Diphtheria.—Two cases, one fatal. There were four cases in Ellsworth, all fatal, my fatal case being one of the four. There was a combination of unsanitary conditions, such as badly constructed vaults and drains, polluted water, and decaying animal and vegetable matter, in these cases.

Campton Village—John Lance, M. D.

Typhoid Fever.—Two cases, neither fatal; one in town and one in Waterville. Think the disease is caused by decaying animal matter.

Diphtheria.—None observed.

Canaan (*Vt.*)—Artemas Ward, M. D.

Typhoid Fever.—None in town. One case in Clarksville, not fatal. Think the disease is caused by bad sanitary conditions. The drinking-water was polluted in the above case.

Diphtheria.—One case in Clarksville. Attribute the source of the disease to badly constructed vaults, drains, and cesspools, polluted water, and decaying animal and vegetable matter.

Canaan—GEORGE E. LEET, M. D.

Typhoid Fever.—Twelve cases; seven in town, two fatal; three in Dorchester, and two in Hanover. Generally I attribute the cause to impure water. In all but two cases there was a suspicion that the water was polluted from bad sanitary surroundings. In two cases the water used was from a spring supposed to be uncontaminated.

Diphtheria.—I have not treated any cases of diphtheria or scarlatina during the year.

Canaan Street—A. WHEAT, M. D.

Typhoid Fever.—There has been a great falling off in the number of typhoid cases since I commenced business in this town some forty years ago. Formerly it was not uncommon for us to have from twenty to sixty cases during the year, many of them fatal. The question might be asked, why this difference? There are two apparent reasons: the people give more attention to the sanitary conditions of their buildings, and are more particular in regard to their drinking-water. I remember that when the Depot village was first built up, water was obtained by digging wells wherever this could be most easily accomplished. The land, in fact, was once the bed of a lake. Now the water supply of the village is obtained from springs of pure, clear water back in the hills. Very much has been accomplished by calling the attention of our people to the conditions in and about their buildings, which have heretofore been neglected.

Canaan—EDWARD M. TUCKER, M. D.

Typhoid Fever.—Two cases, not fatal. In one case running water was used, in the other it was obtained from a well beneath the house. Everything about the premises appeared to be in good order.

Diphtheria.—Three cases, one fatal, all in Grafton. Filth, indoors and out, was, I believe, the cause of these cases. Think the most common source is contagion. We are having quite a stir about some diphtheria cases five miles north of us. It seems that a boy fifteen years old left home and spent one night in Grafton, where my boy died of the same disease last November, and where two other cases were sick at the time, and it being one of the cold nights, the folks put two extra quilts on his bed that had not been washed since they were used in the sickness. Returning home the boy complained of a sore throat, and his father, one of those wiser Frenchmen than the "Corinthians," sent for alcohol, the Frenchman's cure-all, and let his seven or eight children, his wife, and himself go along, all complaining of sore throat, eleven days, when a physician was called. Two of the family died. From there it was carried by an old man to his family, where first a baby about a year old died Thursday, one older died Friday, and the mother, not twenty years old, died Sunday, and the father, twenty-two, was reported dying Sunday afternoon. Monday morning neither the children nor the mother were buried, and they were not seen by a physician. In the first house there were ten persons; all had it, two died. In the second house of nine persons, eight had the disease, three died, and where it will end I do not know. The selectmen called on me to go and attend them, but I sent them to the family physician.

Candia—L. E. GRANT, M. D.

Typhoid Fever.—Two cases, not fatal. The drinking-water was polluted in both cases. Attribute the disease to a specific poison.

Diphtheria.—Three cases, one fatal. My two worst cases were caused, I am quite sure, by bad sanitary conditions.

Charlestown—N. G. BROOKS, M. D.

Typhoid Fever.—One very severe case; do not know the cause.

Diphtheria.—None in my practice.

Charlestown—J. M. WHITAKER, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Chesterfield—JOHN F. BUTLER, M. D.

Typhoid Fever.—Four cases, all recovered. All the cases were in new houses on dry land, no visible cause.

Diphtheria.—Five cases, none fatal. Think all the cases are fairly attributable to impure water. There was no extension of the disease by contagion, although many were exposed.

Claremont—C. W. TOLLES, M. D.

Typhoid Fever.—Five cases, none fatal. Three cases in one family were from drinking well water contaminated by water-closet within three feet of well.

Diphtheria.—Five cases, none fatal. Two patients were under ten years of age.

Claremont—A. R. CUMMINGS, M. D.

Typhoid Fever.—None observed.

Diphtheria.—One case, not fatal. No bad sanitary conditions in this case. Think contagion the most common source of the disease.

Colebrook—F. C. HARRIS, M. D.

Typhoid Fever.—Two cases, one fatal. In one case the water used was undoubtedly very impure. The other patient, a young man, was repeatedly in the house where the first case occurred, and was often exposed to the same surroundings.

Diphtheria.—One case, recovered. The young man had recently arrived in town, therefore do not know his previous history. In my opinion contagion is the most common source of this disease, as well as of typhoid fever.

Colebrook—C. C. NORRIS, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Concord—G. P. CONN, M. D.

Typhoid Fever.—Four cases, none fatal. There was no evidence of water pollution in these cases. Attribute the cause to a germ not yet recognized.

Diphtheria.—Five cases, none fatal. Have no knowledge that any of them were caused by polluted water, decaying animal or vegetable matter, etc., yet there can be no doubt but the want of good sanitary conditions furnishes a common ground in which the germs of diphtheria and other forms of disease can find an abiding place, and there await the combination of events that will develop the disease.

Concord—F. A. STILLINGS, M. D.

Typhoid Fever.—Two cases, not fatal. One case occurred in a family, another member of which had had the disease a year previous. The house has no water-closet, all using a common dry vault. Attribute the cause of the disease to a specific typhoid germ.

Diphtheria.—One case, not fatal; the disease was contracted out of town. Think the disease is caused by a specific diphtheritic germ coming in contact with mucous surfaces.

Concord—GEORGE COOK, M. D.

Typhoid Fever.—Four cases, none fatal. All were due to overwork and bad sanitary conditions.

Diphtheria.—Two cases, not fatal.

Concord (*Asylum*)—C. P. BANCROFT, M. D.

Typhoid Fever.—None.

Diphtheria.—None.

Concord (*Birch Dale*)—LUCINDA S. HALL, M. D.

Typhoid Fever.—None observed. Think the disease is caused by impure water and bad drainage, also by unventilated sleeping apartments.

Diphtheria.—None observed. In my opinion the most common source of the disease is an impure atmosphere, and sometimes from colds and infected meats.

Contoocook—J. W. WILSON, M. D.

Typhoid Fever.—None observed. Attribute the cause of this disease to bad drainage and other unsanitary conditions.

Diphtheria.—One case, mild. Sore throats have prevailed to some extent, but am not aware of any serious cases. In the tenement house where my case occurred, the sewer pipes were defective, thus allowing the sewage to be discharged into the cellar.

Conway—S. A. EVANS, M. D.

Typhoid Fever.—None in my practice.

Diphtheria.—None in my practice.

Conway—DANIEL WATSON, M. D.

Typhoid Fever.—Three cases, none fatal. The drinking water was polluted in every instance. Consider filth to be the most common source of the disease.

Diphtheria.—Eight cases, all in town, none fatal. There were bad sanitary conditions in three cases, and the other five followed from direct contagion. Artribute the cause of the disease to filth.

Conway—W. H. BRAGDON, M. D.

Typhoid Fever.—Twenty-five cases, six fatal; seven in town, one fatal; eighteen in Bartlett, five fatal. Attribute the cause to bad water and contagion.

Diphtheria.—None worth mentioning. (History of typhoid cases to be sent.)

North Conway—JOSEPH H. PITMAN, M. D.

Typhoid Fever.—Five cases, one, with heart and lung complication, fatal; three in town; two in Jackson. I was unable to ascertain the cause. In one case I attributed it to bad sanitary surroundings. In each case the water used was excellent.

Diphtheria.—None observed.

Cornish—GEO. W. HUNT, M. D.

Typhoid Fever.—Two cases. Could discover no satisfactory cause in these cases. Perhaps in one the water was contaminated, but no positive proof could be obtained.

Diphtheria.—None observed. In my opinion contagion is the most common source of the disease.

Deerfield—G. H. Towle, M. D.

Typhoid Fever.—No cases have appeared.

Diphtheria.—None observed.

Derry Depot—I. H. Adams, M. D.

Typhoid Fever.—Six cases, two fatal. Have found bad sink-drains in almost every case this year. Do not know that the drinking-water was polluted.

Diphtheria.—Four cases, none fatal; two in town, and two in an adjoining town. Could not trace any of the cases to a definite cause. Consider filth the most common source of the disease.

Dover—Levi G. Hill, M. D.

Typhoid Fever.—Three cases, none fatal; other cases not typical. Could discover no satisfactory cause in these cases. Our water supply is from springs, through logs and iron pipes for mains, and lead or iron supply pipes.

Diphtheria.—About a dozen cases, none fatal. It is difficult to say whether or not bad sanitary conditions had any connection with the cases. Consider impurities to be the most common source of the disease.

Dover—T. J. W. Pray, M. D.

Typhoid Fever.—Two cases. Attribute these cases to dampness of street and defective drainage.

Diphtheria.—One case, which was probably caused by a bad vault at schoolhouse. Think the disease may often be traced to colds, improper drainage, and cellarless houses.

Dover—John R. Ham, M. D.

Typhoid Fever.—One case, not fatal. Could discover no contamination of the drinking water in this instance. Attribute the cause of the disease to the introduction of a *contagium vivum.*

Diphtheria.—One case, not fatal. Exposure to diphtheritic patients is, in my opinion, the most common source of the disease.

Dover—CARL H. HORSCH, M. D.

Typhoid Fever.—One case. This case was caused by bad drainage, which has since been improved.

Diphtheria.—None observed.

Dover—SMITH AND CHAMBERLAIN, M. DS.

Typhoid Fever.—Three cases, one fatal. Attribute the cause of the disease to a specific poison.

Diphtheria.—Three cases, none fatal. Attribute the disease to a specific poison.

Dover—M. C. LATHROP, M. D.

Typhoid Fever.—One case, not fatal. Sanitary conditions apparently good.

Diphtheria.—None observed.

Dover—CHARLES A. FAIRBANKS, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Enfield—VALENTINE MANAHAN, M. D.

Typhoid Fever.—Two cases, none fatal, both in East Lebanon. The spring from which the drinking-water was taken was situated under the house, unventilated and liable to contamination. The water was already polluted.

Diphtheria.—Three cases, none fatal, all in East Hanover. These cases occurred in one family, and the surroundings were in a fetid and bad sanitary condition.

Enfield Centre—F. P. FISHER, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Five cases, two fatal. Think contagion the most common source of the disease.

Epping—F. W. SPAULDING, M. D.

Typhoid Fever.—Three cases, none fatal. Decomposing animal and vegetable matter was the probable cause of the disease.

Diphtheria.—Seven cases, none fatal; five in town, one in Brentwood, and one in Fremont. Bad sanitary conditions (like badly constructed vaults, drains, cesspools, polluted water, and decaying animal and vegetable matter) existed in fifty per cent of the cases probably.

Epping—H. B. BURNHAM, M. D.

Typhoid Fever.—One case, not fatal. The case came from Haverhill, Mass.

Diphtheria.—Seven cases, two fatal.

Epsom—DANIEL LINCOLN LOCKE, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Exeter—EZRA BARTLETT, M. D.

Zymotic diseases have not prevailed during the last year. The board of health have been more active in the discharge of their duties.

Exeter—WM. G. PERRY, M. D.

Typhoid Fever.—None in my practice.

Diphtheria.—None observed.

Farmington—WARREN P. BLAKE, M. D.

Typhoid Fever.—Two cases in my practice, not fatal. The drinking-water was polluted in one instance. Three cases in town. Do not know the cause of the disease.

Diphtheria.—None observed.

Farmington—D. T. PARKER, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Farmington—WILLIAM H. NUTE, M. D.

Typhoid Fever.—One case, not fatal. The well was situated in the cellar very near the sink-drain, cesspool, and barn-cellar.

Think contaminated drinking water, as a rule, is the cause of both typhoid fever and diphtheria.

Diphtheria.—None observed.

Farmington—H. P. WHEATLEY, M. D.

Typhoid Fever.—Have had only one case, mild. This case occurred on high, well-drained land with clear spring water, but I think the disease was contracted in Massachusetts.

Diphtheria.—None observed.

Fitzwilliam—EDWIN G. ANNABLE, M. D.

Typhoid Fever.—Six cases in one family, none fatal. A daughter brought the disease from Royalton, Mass. Also attended one case in Rindge which resulted in quick consumption.

Diphtheria.—None observed.

Francestown—THOS. F. FISHER, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None in my practice. Think filth is usually the cause of the disease.

Franconia—

Typhoid Fever.—Twelve cases, none fatal; ten in town, two in adjacent town. In one case the disease was contracted while working in a family where the disease already existed. In all probability the drinking-water was polluted in the other cases.

Diphtheria.—Two cases, not fatal, one in town. One case, a boy, had played about the outlet of a drain. Think filth is the most common source of the disease, but at the same time I am not convinced that this alone can produce it.

Franklin—LUTHER M. KNIGHT, M. D.

Typhoid Fever.—Four cases, none fatal. Attribute the disease to emanations from decomposing animal and vegetable matter.

Diphtheria.—Six cases, none fatal. Bad sanitary conditions were present in nearly every case.

Franklin Falls—C. B. NICHOLS, M. D.

Typhoid Fever.—Three cases, none fatal, all in town. Attribute these cases to impure water and want of drainage.

Diphtheria.—None observed.

Franklin Falls—JOHN H. SANBORN, M. D.

Typhoid Fever.—Seven cases. The drinking-water was contaminated in all cases, with perhaps one exception. Attribute the cause of the disease to malaria.

Diphtheria.—Ten cases, one fatal. Bad sanitary conditions were found in all cases. In my opinion imperfect drainage is the most common source of the disease.

Gilmanton—

Typhoid Fever.—One case, recovered.

Diphtheria.—None observed.

Gilsum—I. A. LOVELAND, M. D.

Typhoid Fever.—No case of genuine typhoid fever has occurred in my practice during the past year. There has been one case in town, recovered.

Diphtheria.—Five cases in my practice, one fatal. There have been eight cases in town, one fatal. My fatal case took place under very bad sanitary conditions, by involvement of the larynx. Contagion is the most common source; bad sanitary conditions come next in frequency.

Goffstown—

Typhoid Fever.—Have not seen a case for two years.

Diphtheria.—Did not see a case last year.

Goshen—F. P. JONES, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed. Have had several cases of tonsilitis and three of quinsy.

Grafton—G. W. WEYMOUTH, M. D.

Typhoid Fever.—One case, not fatal. This case came from Manchester, where three others in the same house were attacked by the disease.

Diphtheria.—None observed.

Great Falls—LOUIS L. AUGER, M. D.

Typhoid Fever.—Eleven cases, two fatal. Drinking-water polluted in one case. Attribute the cause of the disease to miasmatic air.

Diphtheria.—Two cases, not fatal. In my opinion miasmatic air produces the disease.

Greenland—WILLIAM O. JUNKINS, M. D.

Typhoid Fever.—Three cases, one fatal; one in town, two in Portsmouth, one fatal. Attribute the cause of the disease to polluted water, emanations from decaying animal and vegetable matters, foul vaults, imperfect drainage, etc.

Diphtheria.—Eight cases, none fatal; one in town, the others in Portsmouth, Newington, Rye, and North Hampton. In one instance, am satisfied that the water was a factor in the case. In my opinion bad sanitary conditions and "catching cold" are the most common sources of the disease.

Greenville—CURTIS A. WOOD, M. D.

Typhoid Fever.—One mild case at Bank Village, and one of typhoid pneumonia at Mason, both recovered. Was unable to discover any specific cause. Not a case in town during the year.

Diphtheria.—None observed. Diphtheritic tonsilitis has prevailed to quite an extent, some cases quite severe. There has been an almost entire absence of the above diseases during the seven years that I have been here. I think this is in consequence of the sharp hills and perfect natural drainage resulting therefrom.

Groveton—C. C. O'BRION, M. D.

Typhoid Fever.—Two cases, one fatal; one each in Stratford and Stark, the latter fatal. Could not ascertain the cause, unless, perhaps, that in Stark was from contagion. The water supply was brought in logs from a spring in the side of a hill; otherwise the sanitary condition was very bad.

Diphtheria.—Four cases, none fatal, one case in town. Think filth is the most common source of the disease.

Hampton—WILLIAM T. MERRILL, M. D.

Typhoid Fever.—Five cases, none fatal; four in town, one in Hampton Falls. I am of the opinion that polluted water was the most fruitful source of the disease.

Diphtheria.—Five cases, all in one family in North Hampton. The first case was fatal and the others very severe. I think these cases may be traced to the bad condition of the vault which was situated near the back door, and the children had been in the habit of spending much time about it.

Hancock—EUGENE WASON, M. D.

Typhoid Fever.—None of true typhoid.

Diphtheria.—None observed.

Hanover—WILLIAM T. SMITH, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Hanover—C. P. FROST, M. D.

Typhoid Fever.—Have had but one case and that very mild. Cause unknown.

Diphtheria.—None observed.

Haverhill—S. P. CARBEE, M. D.

Typhoid Fever.—None observed except in consultation.

Diphtheria.—Not a case of genuine diphtheria in my practice during the year just ended. Have had several cases of sore throat.

Henniker—GEO. H. SANBORN, M. D.

Typhoid Fever.—Two cases, none fatal. The disease was probably caused by poor drainage, and drinking-water contaminated by sink-drain, etc.

Diphtheria.—None observed.

Henniker—LEONARD W. PEABODY, M. D.

Typhoid Fever.—None observed. Attribute the cause of the disease to impure water and infection.

Diphtheria.—None observed. Impure air and water with bad ventilation are the most common sources of the disease.

Hill—W. F. BALDWIN, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Hillsborough—A. C. BURNHAM, M. D.

Typhoid Fever.—Four cases, none fatal; three in town, one in Deering. I think two cases were caused by exposure, bad water, poor drainage, and filth about the house.

Diphtheria.—None observed.

Hillsborough Bridge—ISRAEL P. CHASE, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Hillsborough Bridge—M. H. FELT, M. D.

Typhoid Fever.—Four cases, none fatal. Drinking-water polluted in all cases. Attribute the disease to water pollution and filth generally.

Diphtheria.—None in my practice.

Hinsdale—W. S. LEONARD, M. D.

Typhoid Fever.—Four cases, one fatal; two in town, one fatal, and both complicated, the one with meningitis, the other with rheumatism. Two cases in Ashuelot, a village in Winchester. Could discover nothing impure about the water used in any case.

Diphtheria.—Thirteen well-marked cases, four in town; nine well-marked and severe cases in Ashuelot, four fatal. Besides these there were eleven mild cases, diphtheritic without doubt, but passing under the name of catarrhal sore throat. I attribute the disease in Ashuelot to bad drains, cesspools, pig-sties, and decaying vegetable matter, together with the heavy rains late in the season.

Hinsdale—M. C. DIX, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Five cases, one fatal; four cases in town; one fatal case out of town. In all cases that I have seen bad sanitary conditions have been, seemingly, the principal factor. Think polluted water is the most common source of the disease. Besides the above I have had a large number of what is usually termed "catarrhal sore throat," but which might with truthfulness be called "diphtheria."

Hooksett—

Typhoid Fever.—One case, not fatal. Bad sanitary conditions.

Diphtheria.—Three cases, none fatal.

Hopkinton—G. H. POWERS, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed. I think old wells have been the cause of half the sickness I have ever seen, and I believe that if they could be utterly destroyed together with all other sources of bad water, the doctors would have next to nothing to do. Spring water was brought into this village a number of years ago, and I have not known of a case of typhoid fever or diphtheria in the families supplied with this water during my five years' residence here.

Hudson Centre—D. O. SMITH, M. D.

Typhoid Fever.—Two cases in town, not fatal. The drinking water was contaminated in both cases. This vicinity has been remarkably exempt from all diseases of a malarial type during the past year, and we trust that our families are, as a rule, beginning to see the importance of ventilation, cleanliness, drainage, etc.

Diphtheria.—Three cases in town, none fatal. The disease was probably due wholly to unsanitary conditions.

East Jaffrey—O. H. BRADLEY, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Jefferson—C. H. BURNHAM, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Keene—W. R. DUNHAM, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Keene—A. B. THURSTON, M. D.

Typhoid Fever.—Three cases, two in town from impure drinking-water; a ditch dug to convey surface water from barnyard ran within twelve feet of well. After heavy rains noticed that the water tasted bad and stopped its use after a few days, but not in time to prevent two members of the family having a severe attack of fever, not fatal. Another case in Dublin, caused by drinking water from a brook which ran through a large swampy meadow. Patient recovered.

Diphtheria.—One case, not fatal. There was no evident cause, unless it arose from general filthy condition. Sink-drain was in the best condition of anything about the place. In my opinion typhoid fever is, in the majority of cases, caused directly or indirectly by impure water. We cannot be too careful in selecting our drinking-water.

Keene—IRA J. PROUTY, M. D.

Typhoid Fever.—Four cases, none fatal. One case occurred in a family which had diphtheria last year, the others were apparently under the best sanitary conditions.

Keene—S. M. DINSMOOR, M. D.

Typhoid Fever.—Eight cases, none fatal. In two cases the cause was plainly traceable to water contaminated by sink-drains and vaults; in the others it was not so apparent. Attribute the disease to impure air and water, either or both.

Diphtheria.—None observed during the year. I believe bad sanitation and filth to be the usual cause of diphtheria.

Laconia—ALBERT LINDSAY, M. D.

Typhoid Fever.—None that I could really call "typhoid."

Diphtheria.—Six or eight cases, but none malignant or fatal.

Lake Village—O. W. GOSS, M. D.

Typhoid Fever.—From three to five cases, none fatal. During the month of September, 1884, I had five cases (all children) of typhoid dysentery in one family at West Alton. These cases were very severe, and upon investigation I found a most satisfactory explanation of the whole trouble. The well was situated in a corner of the barn-yard, and the water was so bad at one time that the cattle would not drink it; consequently, the wall was relaid and clay packed around the top, and it was supposed that there would be no further trouble; but the bottom of the well necessarily drained considerable water from the swamp, or low land, and the clay was of little account. A second well was in use a part of the time.

Diphtheria.—One case, recovered. Three other children in the same family had a run of sore throat at the same time.

Lancaster—E. F. STOCKWELL, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Lancaster—FRANK SPOONER, M. D.

Typhoid Fever.—None in my practice.

Diphtheria.—None in my practice.

Lebanon—JAS. A. DAVIS, M. D.

Typhoid fever.—One marked case, could not ascertain the cause.

Diphtheria.—Five cases, one fatal. In connection with these cases, I discovered on a side hill a privy-vault and barrel-cesspool, fifty-two and forty-eight feet, respectively, from the well which was below. Think impure water is the most common source of the disease.

Lebanon—THOMAS H. CURRIE, M. D.

Typhoid Fever.—Three severe cases. Attribute the cause of the disease to filth.

Diphtheria.—Many cases of sore throat, but none of true diphtheria.

West Lebanon—C. B. DRAKE, M. D.

Typhoid Fever.—One case in Plainfield, recovered. Wholly due to contaminated well water.

Diphtheria.—None observed.

Lempster—J. N. BUTLER, M. D.

Typhoid Fever.—One case, not fatal. Could discover no definite cause.

Diphtheria.—None observed. All unsanitary conditions tend toward the disease.

Lisbon—O. H. BOYNTON, M. D.

Typhoid Fever.—I have not known of a well-marked case of typhoid fever in this vicinity during the past year.

Diphtheria.—I think there has not been a case of true diphtheria in town during the past year. I have met with several cases of diphtheritic sore throat, but the characteristic exudation and prostration of genuine diphtheria were wanting. I believe that filth and impure air and water contribute very much to the spread of both typhoid fever and diphtheria.

Lisbon—C. H. BOYNTON, M. D.

Typhoid Fever.—Three cases, very mild, none fatal. Could discover no cause.

Diphtheria.—None observed.

Littleton—F. T. Moffett, M. D.

Typhoid Fever.—Six cases, one fatal; four in town, two in Dalton, one fatal. I am of the opinion that four of the cases were from defective vaults and lead sink-drains.

Diphtheria—None observed.

Littleton—T. E. Sanger, M. D.

Typhoid Fever.—Two cases, not fatal. Usually attribute the disease to polluted water or air.

Diphtheria.—None in my practice.

Littleton—Henry L. Watson, M. D.

Typhoid Fever.—None in my practice. Saw, as council, one case only; severe, but not fatal. Attribute the cause of the disease to contagion, malarial influences, bad water, and other bad sanitary conditions.

Diphtheria.—No well-defined cases have come under my observation. Think there were none in town. I have no doubt that sanitary conditions have much to do in mitigating or aggravating this disease, but I am far from believing that science has yet discovered the initial cause.

Littleton—George W. McGregor, M. D.

Typhoid Fever.—Fifteen cases, one fatal, and an infant that died after the second visit, probably of typhoid, as another case developed in the same house. Thirteen cases, one fatal (the infant above mentioned) in town; three in Bethlehem, one fatal. Unhygienic surroundings undoubtedly played an important part in the disease, as in several instances the cases occurred in groups.

Diphtheria.—None observed.

Londonderry—F. B. Perkins, M. D.

Typhoid Fever.—Thirteen cases, none fatal, all in town. In one instance the well water was condemned, its contamination was so apparent. Probably most of the cases were more or less intensified by polluted water. Attribute the cause of the disease to decomposing animal or vegetable matter.

Diphtheria.—Five cases, none fatal; four in town, one in Windham. In my opinion filth is the most common source of the disease.

Loudon—N. T. Clark, M. D.

Typhoid Fever.—None in my practice; have not known of any in town during the past year.

Diphtheria.—None that could be called diphtheria. Several cases of tonsilitis. Think the cause is atmospheric.

Lyme—J. W. Bean, M. D.

Typhoid Fever.—Six cases, one fatal. Think four of my cases were due to bad drainage, the other two could not be accounted for.

Diphtheria.—Eight cases, none fatal, all in Thetford, Vt. A lady member of the family brought the disease from Lowell, Mass., and the other members of the family contracted the disease from her.

Madison—Geo. M. Atwood, M. D.

Typhoid Fever.—None observed.

Diphtheria.—One case, recovered. Sanitary conditions favorable in the above case.

Manchester—Charles Corey, M. D.

Typhoid Fever.—Three cases, one fatal. Think the fatal case was caused by working during the hottest weather while exposed to the sun, as there was severe brain lesion.

Diphtheria.—Eight cases, none fatal. Attribute the cause of the disease to bad sanitary conditions and atmospheric miasma.

Manchester—C. B. Sturtevant, M. D.

Typhoid Fever.—One case, not fatal. Patient complained of the odor from the sink. Attribute the cause of the disease to a specific poison.

Diphtheria.—None observed. Think the cause is much the same as in typhoid fever.

Manchester—JACOB W. MOOAR, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Manchester—

Typhoid Fever.—None observed.
Diphtheria.—None observed. Attribute the disease to a specific poison.

Marlborough—N. H. MERRIAM, M. D.

Typhoid Fever.—One case, not fatal. Attribute the disease to decomposing vegetable matter.
Diphtheria.—None observed.

Marlborough—J. A. LEET, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Marlow—MARSHALL PERKINS, M. D.

Typhoid Fever.—One case, not fatal, in Stoddard. No cause discovered.
Diphtheria.—Three cases, none fatal.

Meredith—GEORGE SANBORN, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Meredith—H. COOPER, M. D.

Typhoid Fever.—None in my practice.
Diphtheria.—None in my practice. During the past two years we have had a local board of health who have made, during the warm season, semi-monthly investigations of premises in the village, and these have resulted in the removal or disinfection of

considerable filth. I think this has been of great advantange to the community, as we have had but one case of typhoid fever, and that was brought from Massachusetts, I believe. Several orders were given for cesspools to be cleansed, and all such orders were cheerfully obeyed, with one exception. People were instructed how to disinfect their sink-drains, and in what condition to kêep their cellars. Typhoid fever, diphtheria, and scarlatina are becoming less and less prevalent every year in this section of the state.

Meriden—E. G. BEERS, M. D.

Typhoid Fever.—None in my practice. Think the exciting cause of the disease is to be found in decomposing organic matter.

Diphtheria.—Have not had a case for three years.

Meriden—H. SLEEPER, M. D.

Typhoid Fever.—Two cases, one fatal.

Diphtheria.—None observed. Think contagion is the most common source of the disease.

Merrimack—W. W. PILLSBURY, M. D.

Typhoid Fever—Four cases, none fatal; three in town, one in Litchfield. Of the cases in town, the first came from Brockton, Mass., and the remaining two, in the same family, followed from this. Although the surroundings were in an unsanitary condition, think this had little, if any, influence on the cases. The case in Litchfield also came from Brockton, and had no connection with the other cases.

Diphtheria.—None observed.

Milford—W. H. DINSMORE, M. D.

Typhoid Fever.—Three cases, none fatal, all in town. Two were evidently caused by bad drainage, the water being polluted; could not trace the other.

Diphtheria.—Eight cases, one fatal. Think bad sanitary conditions influenced every case. Contaminated water is the most common source of the disease, in my opinion.

Milford—H. S. HUTCHINSON, M. D.

Have been in Milford six months, having removed from Francestown last May. Since coming here, no cases of typhoid fever or diphtheria have occurred. I have, however, had occasion to examine several wells from which water has been and is still being used, and I am morally certain that many others, also in use, are, as were those examined, *polluted waters.*

Milford—A. W. SMITH, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Five cases, one fatal. Contagion is the most common source of the disease.

Milton—W. F. WALLACE, M. D.

Typhoid fever.—Five cases, one fatal; two in town, one fatal; three in Lebanon, Me. In all cases the drinking-water was polluted.

Diphtheria.—None observed. Consider filth, either personal or surrounding, the most common source of the disease.

Milton Mills—CHARLES W. GROSS, M. D.

Typhoid Fever.—Four cases in North Shapleigh, Me., all caused by water from contaminated wells. Think polluted water is the most common source of the disease in the country.

Diphtheria.—Eight cases. Found bad sanitary conditions in every case.

Mont Vernon—FREDERICK CHANDLER, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Two cases, one fatal. One of my cases, a boy nine years of age, clearly showed the contagiousness of the disease, having taken it from a brother, who was nearly well of it, and had just returned from a neighboring town. In the other case, a lady who belonged to a family with "bad throats," the primary cause seemed to be a "cold"; she was also surrounded by rather unsanitary conditions.

Moultonborough—Frank L. Judkins, M. D.

Typhoid Fever.—Two cases, one fatal. One case occurred in March, the other the last of December; hygienic conditions good.

Diphtheria.—Seven cases, two fatal. I think the first four cases were largely due to filth.

Nashua—G. W. Currier, M. D.

Typhoid Fever.—Five cases, three fatal. One was broken down by overwork, one by old age, and one had been here but a few days when taken down, and died on the eighth day.

Diphtheria.—Two cases, neither fatal.

Nashua—Frank A. Dearborn, M. D.

Typhoid Fever.—One case, recovered. Was unable to determine the cause.

Diphtheria.—None observed.

Nashua—George F. Wilber, M. D.

Typhoid Fever.—None in my practice.

Diphtheria.—Two cases, both recovered. One case followed a case of scarlet fever, in a healthy locality, but I suspected contagion from a near case. Think contagion is the most common source of the disease.

Nashua—Robert J. Hallaran, M. D.

Typhoid Fever.—Two cases, neither fatal. Attribute the disease to lack of proper food, hard work, and poor hygienic surroundings at their homes.

Diphtheria.—Three cases, none fatal. I regard bad sanitary conditions, with poor and improperly prepared food, as the prime factors in two of these cases.

New Boston—H. D. Gould, M. D.

Typhoid Fever.—None observed.

Diphtheria.—One case, recovered. A defective sink-drain was the source of the disease in this case.

New Ipswich—F. N. GIBSON, M. D.

Typhoid Fever.—Two cases, sporadic, neither fatal.

Diphtheria.—Four cases, one fatal. October 25, 1885, was called to see Frank C., aged 9 years, who, with his sister, aged 18 months, had recently been sent to his grandparents in this place, from Massachusetts, on account of the sickness of a brother at home, with diphtheria.

Found a well-marked case of the disease. The sister died October 28, with bronchial diphtheria, after a sickness of thirty-six hours. The father and mother came to town October 26, after the death of the child at home, and both had the disease. A fourth child of the family was sent to a relative upon the first appearance of diphtheria, but did not escape it. The family of the grandparents were all affected more or less by the poison.

New Ipswich—FREDERICK JONES, M. D.

Typhoid Fever.—None observed. This section has been wonderfully free from the disease. Attribute the cause of the disease to infection and contagion, and emanations from decaying vegetable matter.

Diphtheria.—None observed.

New Ipswich—FREDERIC W. JONES, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Newmarket—CHARLES A. MORSE, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Thirteen cases, two fatal. I think all these cases resulted from bad sanitary conditions. Eleven were under ten years of age. Think polluted water and bad drainage are the most common sources of the disease. I should say there had been twenty-five or more cases in town, mostly among the poorer class.

Newport—DAVID M. CURRIER, M. D.

Typhoid Fever.—Have not seen a well-marked case of typhoid fever for a year.

Diphtheria.—Two cases, not fatal; one in town, one in Croydon. The drinking-water was polluted in one instance. The well was situated under the kitchen floor, and discharged its water into a sink, the drain of which emptied on the ground outside. The back door was also very near the well, with hog-pen and privy not far away.

Newport—AMANDA H. KEMPTON, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Newport—WM. W. DARLING, M. D.

Typhoid Fever.—None observed.
Diphtheria.—Seven mild cases, none fatal.

Newton—J. F. AXTELL, M. D.

Typhoid Fever.—Five cases, none fatal. Four of the cases were girls from ten to sixteen years of age. They were attacked with the disease from sixteen to twenty-four days after having returned from the beach; and others who were there, and returned to other towns, were also sick with the fever. I attribute these cases to the drinking-water at the beach.

Diphtheria.—Five cases, none fatal. Cannot state the cause.

Northfield—CHARLES R. GOULD, M. D.

Typhoid Fever.—Twenty cases, four fatal; five in town, none fatal. Predisposing cause, anything that lowers or lessens vital resistance. Exciting cause, impure air, improper food, and impure water. The drinking-water was polluted in nearly all cases.

Diphtheria.—Six cases, none fatal, all in Tilton. Think impure air is the most common source of the disease.

Northwood—C. W. HANSON, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Orford—E. C. CHASE, M. D.

Typhoid Fever.—One case, recovered. Could find no particular cause.

Diphtheria.—None observed.

Ossipee—William M. Moore, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Six cases, none fatal; two in town, four in Wolfeborough. Bad water and poor drainage in fifty per cent of the cases. Bad sanitary conditions the most common source of the disease.

Ossipee—Melvin A. Harmon, M. D.

Typhoid Fever.—Four cases, none fatal, all in adjacent town. Do not feel satisfied as to the cause of the disease.

Diphtheria.—None observed.

Ossipee Centre—Wm. H. Grant, M. D.

Typhoid Fever.—None observed. Think the disease is usually caused by contaminated air or water, or both.

Diphtheria.—None observed.

Pelham—A. Batchelder, M. D.

Typhoid Fever.—Cases of typhoid fever have been very rare in this section during the last fifteen years. One or two cases occurred in one family every season for several years until I made the owner of the premises build a roof over his well, in place of a level platform; not a case there since, some eight or ten years.

Diphtheria.—One case, recovered. Diphtheria is primarily a local disease, caused by a vegetable parasite. Spores from decaying vegetable matter, floating in the atmosphere, become lodged in the throat where dust would naturally lodge, there germinate, and from the natural heat and moisture of the parts very rapidly develop.

Peterborough—W. D. Chase, M. D.

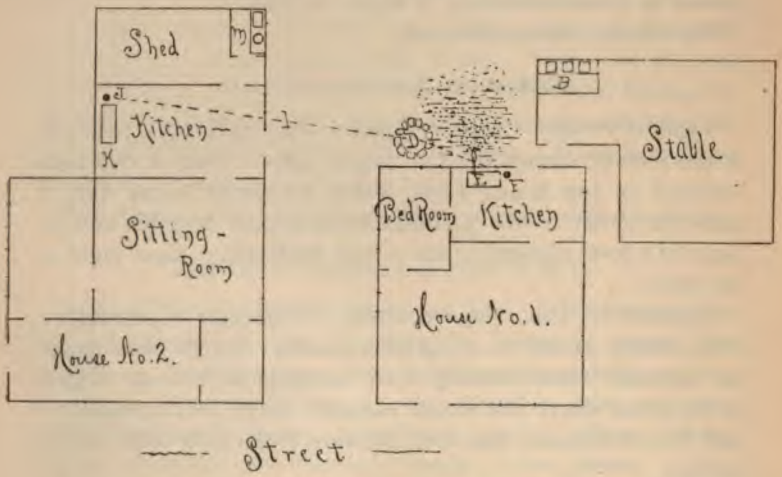
Typhoid Fever.—One case, fatal. This case was contracted at a farmhouse in Sullivan, probably from the drinking-water. Cases of typhoid occurred at this house the previous season.

Diphtheria.—Seven cases, four fatal. In some instances a single case appeared in large families, and these were situated in different parts of the village. It is an infectious disease, but how the infection is communicated I have no clear idea.

Peterborough—JOHN H. CUTLER, M. D.

Typhoid Fever.—Two cases, not fatal. Miss W. came down with the disease Sept. 10. She had suffered from thirst for some time, and being about home drank freely of water from the pump in house No. 2, diagram No. 1. It may be seen by reference that the water came from the well at house No. 1, where a sink-spout and slop-pool from back door had existed for years and were within about four feet of the well, besides the stable and privy were within contaminating distance. There was no call for an analysis of the water as the soakage was readily detected by any one not used to drinking it. Case marked, but recovery complete.

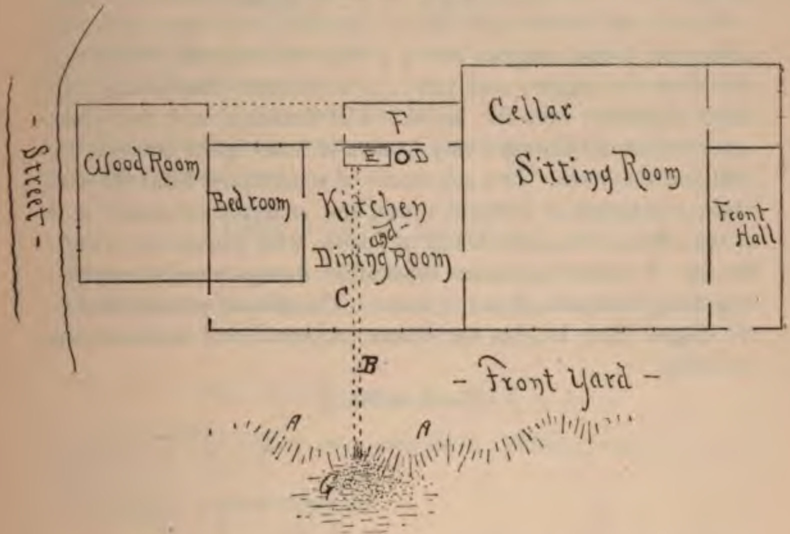
DIAGRAM No. 1.



B—Privy. D—Well. E—Sink. F—Pump. I—Pipe from well to pump in house No. 2. J—Pump in house No. 2. K—Sink in house No. 2. M—Privy in house No. 2.

The second case occurred Sept. 2. By referring to diagram No. 2, it will be seen that the sink drainage passed from the sink on the east side of the kitchen, through an open spout passing directly under the floor and coming to the surface at the foot of the terrace on the west side some twenty feet from the house, and there forming quite a large surface pool. The patient, Mr. F., being of a sensitive organization and having suffered several days with his stomach, fell an easy victim to the malaria from the drainage. The case was very marked, but made a perfect recovery.

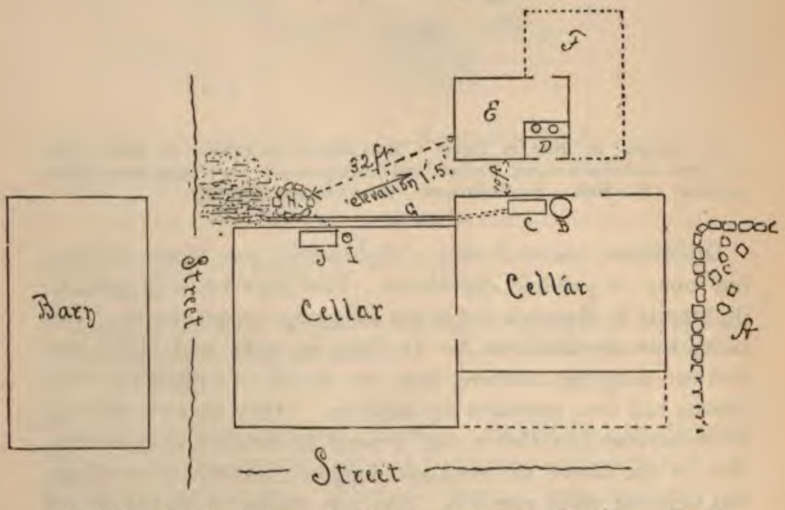
Diagram No. 2.



A—Terrace in front of house. B—Covered sink-drain in front yard. C—Open sink-drain under kitchen and dining-room. D—Pump from cistern to cellar. E—Sink. F—Cellarway. G—Drainage from sink.

Diphtheria.—Several cases of diphtheritic sore throat in town, but none of genuine diphtheria. Had four cases of genuine diphtheria in Hancock under the following circumstances: Was called into the family of Mr. D., July 29, 1885, and found him and two daughters suffering from the sequel of diphtheria—the disease had been mistaken for tonsilitis. They were all suffering from extreme sore throat and general prostration, and in addition to the above the youngest daughter, thirteen years of age, was suffering from paralysis. She was unable to read at all and could scarcely see across the room. Mrs. D. was sick in bed, with throat extremely sore and covered with diphtheritic exudation, and lungs much oppressed in upper part from which mucus was constantly thrown off. This state of affairs at once led me to an investigation of the sanitary condition of the premises. I found an unventilated cellar containing old boards, bins, and growing vegetables, and an unusually strong odor which was traced to the piggery and privy only ten feet distant, on rising ground, with the soil so porous that the stoning and earth to quite a depth in the bottom and side of the cellar were black with this saturation. (See diagram No. 3.) The well was only thirty-two feet from the piggery and privy, ground quite descending, and about eight feet from the house. The drainage from two sinks was conducted through a very loose and leaky spout between the well and the house. Two specimens of water taken from the well above mentioned at different times, and analyzed by myself and at the office of the state board of health, were proven to be unfit for use. I ordered complete ventilation, fumigation with sulphur, and discontinuance of use of water. The disease proved fatal in the case of Mrs. D., but the others recovered and no new cases occurred.

DIAGRAM No. 3.



A—Old well. B—Cistern. C—Sink in workroom. D—Privy. E—Piggery. F—Pig yard. G—Loose drain from two sinks. H—Well. I—Pump from which drinking-water was pumped from well. J—Sink in dining-room.

Peterborough—M. M. Colby, M. D.

Typhoid Fever.—None observed.

Diphtheria.—One case, not fatal. Believe badly constructed vaults, drains, and cesspools, polluted water, and decomposing animal and vegetable matter are the most common sources of the disease.

Pittsfield—F. J. Aiken, M. D.

Typhoid Fever.—Two cases, neither fatal. Drinking-water polluted in both instances.

Diphtheria.—Three cases, one fatal. I think two cases were caused by allowing the waste water from the kitchen to accumulate near the dwelling.

Pittsfield—S. W. Young, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Two cases, not fatal. Polluted water may have been the cause in one case, bad drainage perhaps in the other.

Plaistow—Edmund B. Frye, M. D.

Typhoid Fever.—Two cases, one fatal. Polluted water in each case.

Diphtheria.—None observed.

Plymouth—Tristram Rogers, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Plymouth—Haven Palmer, M. D.

Typhoid Fever.—One case, not fatal. Attribute the cause of the disease to sewage and decomposing vegetable matter.

Diphtheria.—None observed.

Plymouth—Enos Huckins, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Three cases, none fatal; two in Bridgewater, one in Campton. The case in Campton was contracted while teaching school in the district in Bridgewater, where the other two cases occurred. Could not assign any cause. The drainage was apparently good.

Plymouth—CYRUS K. KELLEY, M. D.

Typhoid Fever.—Only one, and that not a typical case. Have no definite idea as to the cause.

Diphtheria.—Two light cases, recovered. Malaria is no doubt the most common source of the disease.

Portsmouth—JOHN JAMES BERRY, M. D.

Typhoid Fever.—One case, recovered. Cause in this case unknown. Think the disease is usually due to a specific poison, under certain atmospheric conditions.

Diphtheria.—One case, not fatal. In my opinion the most common source of the disease is tonsilitis, when occurring in polluted air and surroundings unsanitary.

Portsmouth—J. W. PARSONS, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Eight cases, one fatal from diphtheritic croup. In my opinion *cold* is the most common source of the disease.

Portsmouth—N. L. FOLSOM, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed. Think that taking cold alone is often the cause of the disease.

Raymond—TRUE M. GOULD, M. D.

Typhoid Fever.—Have seen none this season.

Diphtheria.—Two cases, not fatal. Sanitary condition good in the above cases. Think the disease is sometimes due to contagion, but more commonly to bad drainage, stagnant water, cesspools, etc.

Rindge—W. H. ALDRICH, M. D.

Typhoid Fever.—One case, recovered. I think there is no doubt that it was caused by well water contaminated by sink-drain and privy-vault. (See diagram on following page). The family, a young man and his wife, had moved into a house which had been remodeled, and commenced using water from a well that had not been used for some time, although it had been thoroughly cleaned. In about three months after having moved symptoms of typhoid developed in the wife, and I was called. The fever ran a typical course of two weeks, and subsided with no alarming symptoms. About the third or fourth day the husband complained of similar symptoms, but upon treatment they subsided. Let me say that upon being called I traced the cause as near as I could, and ordered the well to be closed, and water was afterward obtained from a neighbor's.

Diphtheria.—None observed.

Rochester—F. E. Whitney, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed. Think foul air and water are the most common sources of the disease.

Rochester—S. E. Root, M. D.

Typhoid Fever.—None observed. Have practiced in town only a part of the year.

Diphtheria.—One case, recovered. The patient was a young French woman, eighteen years of age and recently married. The source of contagion was a neglected privy-vault. I was called late and a tough membrane had already formed which came away whole, presenting a cast of the affected part. The friends destroyed the membrane, not knowing its value as a specimen. From their description the cast must have been perfect.

Rochester—F. E. Wilcox, M. D.

Typhoid Fever,—None observed.

Diphtheria.—One case, fatal. I ascribe the disease to the action of parasitic fungi, or bacteria, the *Micrococus diphtheriticus.*

Rollinsford—F. E. Brigham, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

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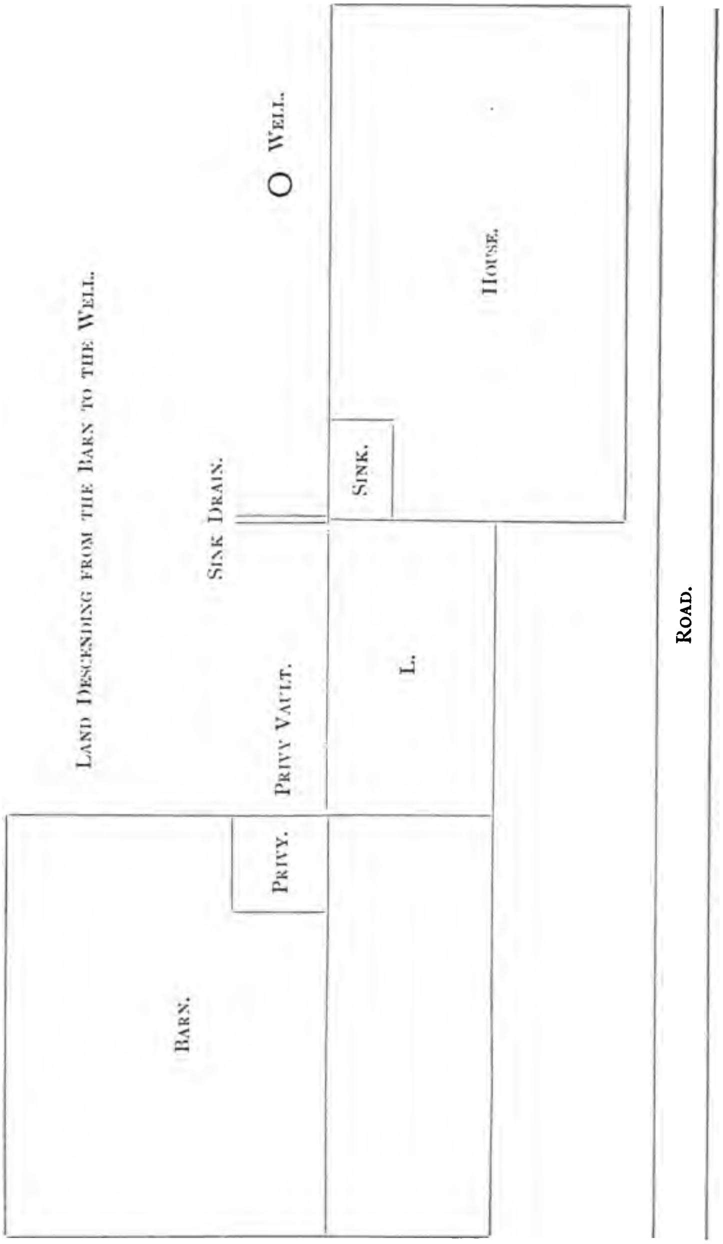
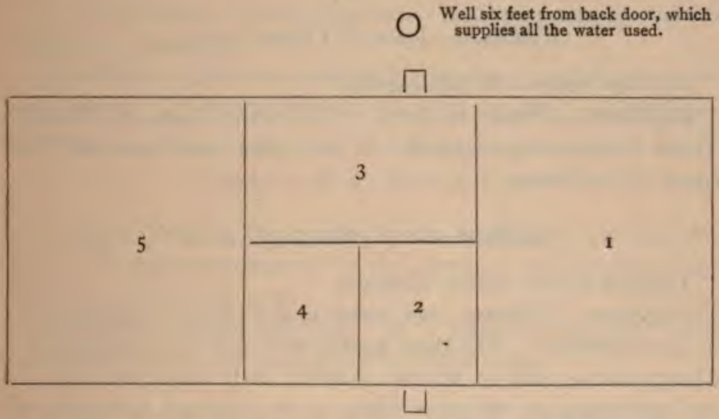

Land Descending from the Barn to the Well.
Well.
House.
Sink.
Sink Drain.
Privy Vault.
L.
Privy.
Barn.
Road.

Rumney—A. S. Russell, M. D.

Typhoid Fever.—None observed. I attribute the disease to animal and vegetable matters in a state of decomposition.

Diphtheria.—Two cases, one fatal. Bad sanitary conditions influenced these cases to a large extent. I think animal poison is the most common source of the disease, but how it is propagated we are unable to say.


Well six feet from back door, which supplies all the water used.
3
5
1
4
2

1—Room used as kitchen, dining and sleeping room. All waste water and other matter were thrown from the window of this room. 2—Front door and hall. 3—Buttery with back door leading to well, which is six feet from door and about eight feet deep. 4—Back room. 5—Shed.

The barn, or stable, is about four rods from house and on lower ground. Case 1 was confined to room 1, age five years. Exudations in large patches were thrown off, and for forty-eight hours before death could breathe as well as ever, but without proper nourishment gradually sank and died. Case No. 2 was sick in the attic over room 1, age 11 years. Recovered with no complications.

Salisbury—William Richardson, M. D.

Typhoid Fever.—Two cases, none fatal. Could not determine the cause; possibly the water may have been contaminated.

Diphtheria.—None observed.

Sanbornton—EDWARD ABBOTT, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Sandwich—E. Q. MARSTON, M. D.

Typhoid Fever.—None observed.
Diphtheria.—None observed.

Scytheville—JOHN P. ELKINS, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None in town. Two mild cases in Wilmot. Think decomposing vegetables in the cellar may have been the cause of the disease.

Seabrook—D. W. COLCORD, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Fifteen cases, none fatal; eleven in town, four in East Salisbury. The cases mostly were not of a severe type. Changes from cold to warmer weather, with thaws and rain, in my experience, are the most likely to be followed by attacks of diphtheria; but think that very often it needs the element of "catching cold" to determine an attack. Have observed many cases in houses having water in the cellar at the time the disease appeared.

Somersworth—ALVIN JENKINS, M. D.

Typhoid Fever.—From eight to ten cases during the fall months, none fatal; but I would modify this statement somewhat by saying that my diagnosis was not always entirely satisfactory to myself, inasmuch as the symptoms to a certain extent seemed almost identical with those of typhus fever, still I called them typhoid. In these cases I trusted largely to the unaided powers of nature to effect a cure, and was not disappointed. I would here remark that the more experience and observation I have, the more inclined I am, as a rule, to apply less powerful remedies and to trust more to nature. As to the causes, direct or indirect, of typhoid fever, I think their name is *Legion*.

Diphtheria.—Perhaps half a dozen very mild cases, not well marked. The sanitary conditions were ordinarily good, so far as could be ascertained. In my opinion the most common source of the disease is a scrofulous or a syphillitic diathesis, or a condition in which the body is depraved.

South Newmarket—C. W. Scott, M. D.

Typhoid Fever.—None observed. Attribute the disease to miasmatic contagion.

Diphtheria.—One case, not fatal. Sanitary conditions apparently good. Think contagion is the most common source of the disease.

Sunapee—E. C. Fisher, M. D.

Typhoid Fever.—Three cases, none fatal. In one case the well water was contaminated by sink-drain, in one by vault, and in the other by barn-yard.

Diphtheria.—None observed. It is probable that most cases of this disease are due to bad sanitary conditions.

Suncook—J. R. Kimball, M. D.

Typhoid Fever.—Three cases, none fatal; two in town, one in adjoining town. Do not know the cause.

Diphtheria.—None observed.

Suncook—Geo. H. Larabee, M. D.

Typhoid Fever.—Three cases, none fatal. The water was undoubtedly badly contaminated by cesspools, sink-drains, hog-pens, vaults, etc., in these cases.

Diphtheria.—None observed.

Surry—W. H. Porter, M. D.

Typhoid Fever.—One case, recovered.

Diphtheria.—Ten cases, none fatal, all in Gilsum. Filthy surroundings and polluted drinking-water seemed to be the main factors in generating the disease.

Sutton—S. N. Welch, M. D.

Typhoid Fever.—None in town during the past year.

Diphtheria.—None in town.

North Sutton—J. R. Smiley, M. D.

Typhoid Fever.—None of true typhoid. Several cases of typhoid pneumonia; one fatal, a man seventy-eight years of age. Attribute the immediate cause of the disease to taking cold. Have no means of telling whether the water was contaminated.

Diphtheria.—Have not seen any. Sore throats have been very common, occasionally one with small patches of membrane.

Swiftwater—J. Brownson, M. D.

Typhoid Fever.—Two cases, not fatal. Think the disease was produced by working near stagnant water.

Diphtheria.—Three cases, none fatal. Think unsanitary condition of dwellings is the most common source of the disease.

Tamworth—

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Tilton—J. J. Dearborn, M. D.

Typhoid Fever.—Three cases, none fatal. In all these cases the water used in the family was contaminated by cesspools, sink-drains and vaults.

Diphtheria.—Three cases, none fatal.

Troy—M. T. Stone, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Tuftonborough—T. Avans Haley, M. D.

Typhoid Fever.—Two cases, neither fatal. Think the disease was caused by working in the vicinity of stagnant water. In one case the drinking-water was contaminated.

Diphtheria.—None observed.

Wakefield—JOHN E. SCRUTON, M. D.

Typhoid Fever.—Three cases, none fatal; two in Milton, one in Acton, Me. The drinking-water was impure in one case.

Diphtheria.—None in my practice.

Wakefield—SAMUEL W. ROBERTS, M. D.

Typhoid Fever.—None observed. From an observation of thirty-five years I think malarial poison the primary cause of pure typhoid. Never have seen a case where I thought contaminated water was the primary cause.

Diphtheria.—None observed during the past year. Do not know that filth originates the disease, but it is an exeellent garden in which to plant it.

Walpole—A. P. RICHARDSON, M. D.

Typhoid Fever.—None in my practice.

Diphtheria.—None observed.

Walpole—W. B. PORTER, M. D.

Typhoid Fever.—None observed. I think there has not been an idiopathic case in our town during the past year. Attribute the cause of the disease to a specific poison.

Diphtheria.—One mild case; could discover no specific cause. The sanitary conditions were good. The case was isolated, and no others resulted.

Warren—R. E. MERRILL, M. D.

Typhoid Fever.—None in town. Attribute the disease to filth and atmospheric changes.

Diphtheria.—None observed.

Warren—E. A. TOBY, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Five cases, very mild type. I think we do not pay sufficient attention to sanitary conditions, although our situation is better than that of most towns.

East Washington—George N. Gage, M. D.

Typhoid Fever.—Two cases, one fatal, both in adjacent town. In one case the drainage was very poor, and this had evidently produced gastric and intestinal derangement in other members of the household. The sink-drain had been allowed to discharge within a very short distance of the well from which the family obtained drinking-water.

Diphtheria.—None observed.

Webster—Nathaniel H. Arey, M. D.

Typhoid Fever.—One case, not fatal. Attribute the cause of the disease to nervous exhaustion, caused by the unequal distribution of animal magnetism.

Diphtheria.—None observed.

Wentworth—F. A. Durkee, M. D.

Typhoid Fever.—None observed.

Diphtheria.—Two cases, neither fatal.

Westmoreland—James A. Craig, M. D.

Typhoid Fever.—None in town.

Diphtheria.—None in town.

West Swanzey—Geo. I. Cutler, M. D.

Typhoid Fever.—Five cases in all, with two fatal; four in town, two fatal; one in Richmond. One case I attributed to the bad sanitary condition of a tenement house.

Diphtheria.—Two cases, one fatal. Cause not discovered. Think polluted water and bad drainage the most common source of the disease.

Whitefield—George S. Gove, M. D.

Typhoid Fever.—One case, not fatal. The disease was contracted in New York city from another member of the family, and developed after leaving home. The case was of long duration from anxiety and over-feeding, the latter twice causing a rapid rise in the temperature.

Diphtheria.—None observed. Think the disease is most commonly due to contagion.

Whitefield—J. L. McGregor, M. D.

Typhoid Fever.—None observed.

Diphtheria.—None observed.

Wilton—J. Fleeman, M. D.

Typhoid Fever.—Five cases, none fatal. Think the disease is mostly due to bad drainage.

Diphtheria.—Two cases, not fatal. Could discover no cause. I attribute the disease to atmospheric conditions and contagion.

Wilton—George W. Hatch, M. D.

Typhoid Fever.—Three cases, none fatal. Filth in its several forms is the cause of the disease. The drinking-water was contaminated in two cases.

Diphtheria.—None observed.

Winchester—Webster O. Hardy, M. D.

Typhoid Fever.—None observed. Attribute the cause of the disease to a specific germ which is not produced by filth, but if the germ is present, bad sanitary conditions favor its growth and propagation. As an illustration of this may be mentioned a town in which most of the families used water from the hotel well and were entirely free from typhoid fever until a traveler sickened and died there. It then followed that every family using the water had the disease, while those who obtained water elsewhere were entirely exempt. The contents of the vault had found entrance into the well. I believe that vaults, hog-pens, sewers, etc., offer the very best means for the propagation of the germs. As regards wells, many are situated on ground somewhat elevated above vaults, etc., and are therefore considered safe; but there may still be danger, as it often happens that the lower stratum of earth slopes in an entirely different direction from that of the surface, thus offering a free entrance to the well for all impurities.

Winchester—GEORGE W. PEIRCE, M. D.

Typhoid Fever.—One case, continued from last year, recovered. This case came from West Swanzey, where the fever was prevalent.

Diphtheria.—Eleven cases, two fatal. Four fatal cases besides the two given above, in town. In four cases the disease seems to have had no discoverable cause; the other seven occurred where there had been recent communication with a patient previously suffering with the disease.

Wolfeborough—N. H. SCOTT, M. D.

Typhoid Fever.—Seven cases, none fatal; two in town, five in New Durham. Could find no cause except in a family in which two cases occurred. A sample of the water used by them was pronounced by Prof. Angell "bad water." *

Woodsville—C. R. GIBSON, M. D.

Typhoid Fever.—Eight cases, none fatal. Attribute the cause of the disease to overwork without proper food, bad drainage and general lack of cleanliness.

Diphtheria.—None observed.

Winchester—A. H. TAFT, M. D.

Typhoid Fever.—Two cases, none fatal. May 5, 1885, Mrs. C. P., residing in Winchester, gave birth to a son; convalescence protracted. Child "brought up" on bottle; deranged condition of bowels from the first. Mother and child in a miserable condition for two months. Upon examination of the premises I found that the sink-drains and well were separated by about six feet of very porous earth. (See diagram on following page.) The condition of both patients remained unimproved until the use of the water on the premises was discontinued, and this was brought about only by calling the attention of the State Board of Health to the condition of affairs.

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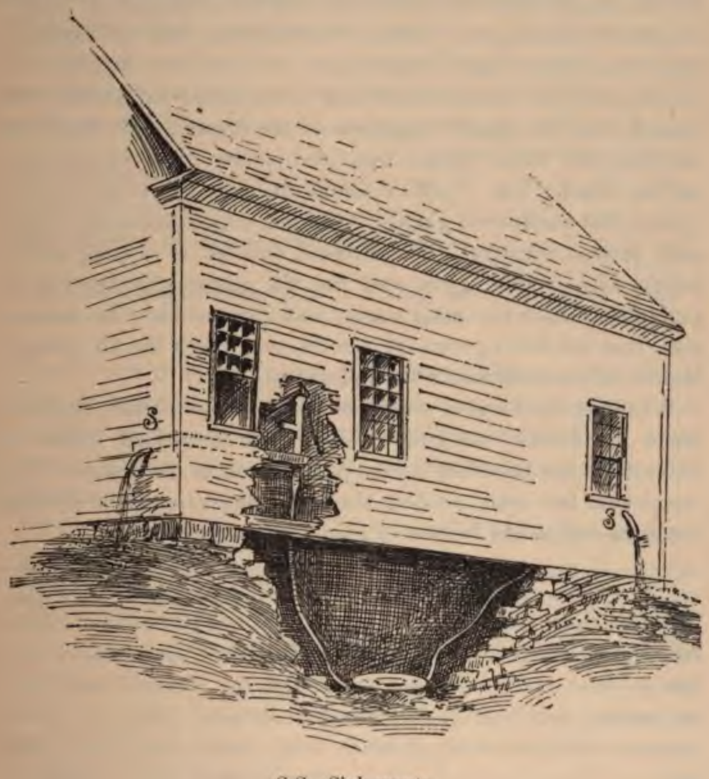
* "The color is unfavorable. The water residue is full of circular patches indicating organic matter in solution. The residue blackens on ignition, but the blackening does not persist. The indication inclines to animal matter. The chloral is in excess (2.). The free ammonia not excessive (0.05); albumoid ammonia not determined. The water reduces permanginic acid. There are no nitrogen acids. Microscopic examination: Cyclops quadricornis and bacteria. Bacteria termo in the zoöglœa form, well marked. The water is polluted with some form of animal matter. It is bad water."

Diphtheria.—Fifteen cases, none fatal. One case was contracted in Massachusetts.



S S—Sink-spouts.

The following summary of reported causes of typhoid fever is exceedingly interesting. It shows to what an extent filth in some form, or other causes which are largely avoidable, enter into the question of typhoid fever production. Such opinions are also given by the medical profession in every country of the civilized world. Typhoid fever destroys more lives than cholera, or yellow fever, or small-pox, or any other pestilential disease, and no country escapes its ravages. How to avoid it is forcibly suggested, indirectly, in a knowledge of its causes. The following table would seem to indicate that there is a growing belief that the disease is dependent upon a specific germ, or poison. This is undoubtedly true; and the sooner such a theory is recognized by the practitioner, the sooner will scientific principles be applied to prevent its ravages. Indeed, it is believed that the particular germ has already been discovered. It was first described by Eberth, and has been studied and investigated by Goffky, who regards it as the specific organism of the disease. He found the bacilli in the blood drawn from the spleen of a typhoid fever patient during life. Goffky found them in the kidneys, liver, spleen, and mesenteric glands. Culture experiments have, however, proved negative. The English authors, to a large extent, believe in a specific germ, and that the germs after leaving the body often reach the water supply and thus produce the disease; also, that the dried germs, or poison, may reach the air passages and in this manner infect the individual.

Whatever the form or nature of the germ, or poison, that produces the disease, we know that certain conditions, classed as unsanitary, are necessary to the propagation of the disease. This conclusion has been reached through observation in individual cases, as well as the history of epidemics of the disease.

CAUSES.	1882	1883	1884	1885
Polluted water	36	36	45	53
Filth	10	20	18	17
Bad drainage	7	9	2	6
Low water	5	4	4	....
Sink	4	4	5	2
Privy	3	....	3	....
Decaying vegetable matter	2	4	....	5
Infection	3	....	2	....
Contagion	1	3	4	....
Bad ventilation	2	....	....	....
Sewer gas	....	3	....	....
Malaria	....	3	1	....
Overwork	2	1	1	4

Low vitality	2			
Foul cellar		2		
Atmospheric	2		1	
Swampy land	1			
Bed of pond			1	
Newly plastered house		1		
Sink and privy	1			
Nervous exhaustion				1
Specific poison, or germ				11
Total causes reported	81	90	87	99
Causes not discovered	11	23	22	19
Number who gave no answer to question of origin	103	32	82	91*
Total number of physicians reporting	195	155	191	207

It will be seen in the above table that polluted water stands greatly in excess of all other reported causes. The reported cases are almost without exception attributed to contaminated wells. In some instances other factors are mentioned in connection with polluted water.

Under the head of "filth" are classed "bad surroundings,' "unsanitary conditions," etc.

Good authorities assert that typhoid fever is the scourge of the farmer. The conditions which are most favorable to its development are most frequently found at farmhouses and in villages. Cities as a rule have a good water supply, or at least a supply not polluted by filthy drainage. Sewers, while they may perhaps, as often constructed, cause other diseases, have undoubtedly contributed to lessen typhoid fever.

Spontaneous cases of the disease often appear in sparsely settled localities, so often that many physicians have no doubt that certain conditions develop *de novo* the particular poison that produces the disease. The Massachusetts State Board of Health, after giving considerable study to the subject, came to the conclusion that typhoid fever might be produced in three ways: 1. By foul water; 2. By foul air; 3. By emanations from the earth, occurring most frequently in the autumn and in seasons of drought.

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* Seventy-eight had not observed a case during the year.

Dr. Cabell, in a paper read before the American Medical Association in 1877, protested against the idea that a prior case was necessary to the existence of typhoid. Dr. Pinckney Thompson, the able president of the Kentucky State Board of Health, says: "As I study the literature of the etiology of typhoid fever, coupled with an experience in the practice of medicine for thirty years, I am forced to the conclusion that typhoid fever does originate from other causes than the contagion of a previous case."

With a knowledge of such facts as we already possess, there is much that can be done to prevent the disease, although it is not probable that it will ever be eradicated.

Diphtheria, one of the scourges of the young, is believed by the medical profession to be as closely allied to bad sanitary conditions as typhoid fever, while it has one element in its propagation very much more marked,—contagion.

*Newmarket**—CHARLES A. MORSE, M. D.

Diphtheria.—Since Oct. 1, 1885, there have been 91 cases of diphtheria in this town, 20 cases proving fatal. The average age of the fatal cases was 6 years; one case, a young lady, being 17 years and 9 months old. Taking into account the severity of the epidemic, I think that a good per cent of our cases have recovered. We have not been able fully to ascertain as yet the cause. At first we thought it came from one of the school buildings, but upon close examination we came to the conclusion that that was not the fact, and we are still in doubt. Our sewerage is not of the best; but no one is to blame but the townspeople, as they won't appropriate money to do it, and it cannot be done for nothing. We have done the best that we could to keep the disease confined to certain limits, and have practiced isolation as far as we could, and we have been ably assisted by the board of health.

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* Secured too late to be inserted in the regular alphabetical order.

The following table is interesting in showing a partially classified arrangement of the reported causes of diphtheria for the past four years: —

CAUSES.	1882	1883	1884	1885
Bad sanitary conditions	20	30	16	25
Contagion	13	18	5	15
Polluted water	6	3	3	16
Bad drainage	5	6	5	4
Sink	6	....	3	1
Atmospheric causes	5	5	7	3
Filth	3	4	6	20
Decaying animal and vegetable matter	3	2	....	2
Cesspool	2	1	2	....
Damp and foul cellar	....	....	5	....
Exposure to dampness	1	3	3	....
Poor ventilation	1	1	1	....
Local cause	1	1	....	....
Malaria	....	1	....	2
Cause not discovered	12	17	17	5
Neglected vaults	....	....	....	2
Infection	....	....	....	1
Cold	....	....	....	3
"Scrofulus diathesis"	....	....	....	1
Specific germ, or poison	....	....	....	5

The table presents only an approximate statement of causes, since in many instances several conditions are reported in an individual experience, while the classification is made under one head. For instance, if we find given as a cause "polluted water and bad drainage," we classify it under one head, — polluted water. The entries in the table include all answers given as to the cause; several did not answer the question. The evidence is, however, all that a rational mind needs to reach the conclusion that bad sanitary conditions are intimately associated with the disease. The element of contagion should be more generally recognized than it has been heretefore. Many lives have been lost through neglect to isolate the disease whenever and wherever it appears. When it is conceded, more than that, demonstrated, that we have within our reach the means of lessening such diseases, it seems a terrible commentary upon the humanity of individuals, families, and municipalities that the slaughter should go on, surrounded by such passive indifference as to make one's blood almost run cold.

The facts which are presented above should be a warning to every individual, a monitor to every family, and a revelation to inactive health boards of the inexcusable responsibility which rests upon them.

NOTE.—"The Practical History of a New Epidemical Miliary Fever with an *Angina Ulcusculosa.*

This Distemper did emerge 20th *May*, 1735, in *Kingston* Township, fifty Miles eastward from Boston. It was no foreign importation, *Kingston* being an inland place, of no Trade or considerable communication. The first seized was a *child who died in three Days Illness;* about a Week thereafter in another Family at four Miles distance, three Children were seized successively, and died also the third Day; it continues spreading gradually in that Township, seizing here and there particular Families with that degree of violence, that *of the first circiter forty decumbents none recovered* as we were informed. It was vulgarly called the *Throat Illness*, or *a Plague in the Throat*, and alarmed the Provinces of *New-England* very much. Some died of a sudden or acute *Necrosis;* but most of them by a *Symtomatick affection of the Fauces or Neck;* that is by *Sphacelations* or corrosive *Ulcerations* in the *Fauces*, or by *an infiltration and tumefaction* in the Chops and fore part of the Neck, so turged, as to bring all upon a level between the *chin* and *sternum*, occasioning a *strangulation* of the Patient in a very short time. After a few Weeks it spreads into the neighboring Townships, but with more mildness." [Extract from a pamphlet by Dr. Wm. Douglass, printed in 1736, and furnished through the courtesy of Samuel A. Greene, M. D., Boston, Mass.]

SCARLET FEVER.

The figures given below, although very incomplete so far as the entire state is concerned, and in some instances the town, are taken from reports sent to the board by the physicians of the locality named. The number of deaths given below does not include, probably, half that occurred throughout the state during the year. The small death rate in comparison with the number of cases reported, indicates that the disease prevailed in a very mild form, as a rule.

Towns.	No. of cases.	No. fatal.	Towns.	No. of cases.	No. fatal.
Alstead	4		Littleton	7	
Antrim	22	1	Loudon	4	
Barrington	2		Manchester	8	
Belmont	4		Marlboro'	7	
Bristol	1		Meriden	3	
Canaan, Vt.	2		Milford	3	
Candia	12		Milton	11	
Campton Village	16		Mont Vernon	6	
Claremont	9		Nashua	51	2
Concord	34		Newport	5	
Conway	9	1	Newton	2	1
Cornish	1		Northfield	4	1
Deerfield	10		Northwood	6	2
Derry Depot	4		Pelham	15	
Dover	10		Peterboro'	8	1
Enfield Centre	4	1	Plymouth	36	3
Epping	5		Raymond	5	
Farmington	7		Rochester	24	1
Fitzwilliam	7		Rumney	1	1
Francestown	2		Salisbury	6	
Franconia	17		Sandwich	1	
Franklin	19	2	Sunapee	1	
Gilmanton	2		Suncook	11	
Gilsum	19		Surry	1	
Goffstown	5	1	West Swanzey	5	
Goshen	1		Tamworth	2	
Great Falls	17	1	Tilton	1	
Hampton	1		Troy	3	
Hancock	14		Tuftonboro'	5	
Hillsborough	31	2	Wakefield	12	1
Hinsdale	12		Walpole	11	
Hooksett	4		Webster	1	
Hopkinton	4		Whitefield	7	
East Jaffrey	12		Wilton	4	
Keene	16		Winchester	5	
Laconia	4		Woodsville	1	
Lake Village	5	1	Wolfeboro'	3	
Lebanon	24				
Lempster	A few cases.		Total	648	23

The following communication received from Dr. Frank Blaisdell, of Goffstown, is worthy of consideration. The course which he pursued is to be recommended to all who have anything to do with this disease.*

SANITARY TREATMENT OF MALIGNANT SCARLET FEVER.

BY FRANK BLAISDELL, M. D., GOFFSTOWN, N. H.

The sanitary treatment of scarlatina maligna in country practice, which has been successful in my hands, is best illustrated by the following case: —

A. C. W., aged 28 months, taken sick October 24, 1885, with vomiting, sore throat, etc., followed the next day with the characteristic eruption of scarlatina, which rapidly took on a malignant form, to which the little patient soon succumbed. Beside the physician, there were in attendance the father, mother, nurse, grandmother, and a neighbor, the first three named being young people, and none of the attendants had ever had the disease, and all were in continuous attendance on the patient. They were all asked to stay on the premises, and word was given to the neighbors of the malignant character of the disease, and no one was allowed to come into the house. Soft linen cloths were used to wipe away the discharge from the eyes, nose, and mouth. These cloths were dipped in a solution of listerine and were at once burned. Solutions of listerine were sprayed through the rooms with the atomizer; it was used as a gargle and for toilet purposes. At death, the little patient was wrapped in sheets wrung out of this solution; the sheets were kept wet and were not removed at all, the patient being buried in them. As soon as possible the coffin was prepared, listing put round the edges, the patient put in, and then into the box, and at once buried. No public funeral was of course allowed, but prayers were had at the grave, there being in attendance only those who had been with the patient.

The bedding in use by the patient was put into the oven of a cook-stove and subjected to as intense heat as could be borne without burning. The contents of the bed were burned, all bedding and clothing were then washed in a solution of bromo chloralum; the cupboards of the room were opened, articles spread out, carpet taken up and washed, the room shut up tight and subjected to the fumes of burning sulphur for forty-eight hours, when the doors were opened and the sulphur fumes allowed to penetrate the rest of the rooms. Then the house was opened and aired, all woodwork washed; the attendants took a full bath, especial attention being paid to the hair, clothing disinfected, and the house pronounced habitable.

Although in a neighborhood where there were many children, there was no other case of the disease. I omitted to mention that the vaults, drains, etc., were flushed with a strong solution of copperas.

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* See circular to local boards of health, printed elsewhere.

This seems a good deal of work for the busy country practitioner, but to my mind it is a more brilliant achievement to keep other homes from being invaded by this scourge of childhood, than to carry to a successful termination cases of scarlatina,—a result that those who have had the malignant form of experience in this disease rarely obtain.

COMPLAINTS, ETC.

During the year quite a number of complaints against nuisances of various kinds were brought directly to the attention of the board. In some instances this was done because there was no active local board of health, and in others circumstances surrounding the cases involved legal questions which the local authorities did not feel like acting upon without the advice of the state board. In every instance prompt attention has been given to such complaints, although some of them did not come primarily within the province of the state board; they should have been adjusted by the local board.

The following cases, including some of the correspondence upon the same, are given for the purpose of illustrating the manner in which the work was done, and also for the incidental information which may be of future use to local health officers.

SLAUGHTER-HOUSE AT CAMPTON.

Early in August a complaint was made to the board that a slaughter-house existed in the village of Campton, which was giving much offense to the inhabitants in the immediate locality, as well as to a large number of summer visitors stopping at the Sunset Hill House. It was represented that unless the nuisance could be abated immediately, many of the summer visitors would leave the place at once.

This village having within a few years gained quite a reputation as a summer resort, the importance of maintaining the best sanitary conditions was at once recognized as being of especial moment. The president and secretary of the board visited the locality and found that there was ample cause for the complaint. The following letter and order were transmitted to the selectmen :—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Aug. 12, 1885.

Board of Selectmen, Campton, N. H.:

Sirs:—Complaint having been made to this board that a slaughter-house existed at Campton Village which was giving offense to summer visitors as well as to permanent residents of the place, Dr. G. P. Conn and myself visited the locality yesterday for the purpose of examining the situation. We found that Freeman C. Smith was using his stable as a slaughter-house, and that the business was carried on in such a manner as to be a nuisance to the people of the vicinity as well as to persons traveling on the public highway. An examination of the premises revealed the fact that the slaughtering was done on the stable floor, and the entrails and other waste products were thrown through a scuttle into the cellar below, in which were several hogs. This cellar presented a most filthy condition, and although no slaughtering had been done (so it was stated) since the *Sunday* before, the waste had not all been consumed by the hogs, and there was also considerable decomposing blood upon the stable floor, so that the premises exhaled a stench that was almost intolerable. The chief complaints come from the boarders at the Sunset Hill House.

Aside from the question of health and comfort, neither of which should be interfered with, there is another which has an important bearing upon the welfare of your town, and which you in your official capacity should recognize, to wit, *financial prosperity.*

Campton has become a town of summer resort, and justly so on account of its beautiful location, cool atmosphere, and pure water from the hillsides; and the number of buildings recently erected and now in process of construction shows that the money brought into your town by summer travel has largely increased the valuation of property, and under favorable conditions will continue so to do, thereby in many ways benefiting the people; hence, from this standpoint alone you cannot afford to tolerate for a day a nuisance which will affect the comfort and happiness of your summer visitors.

The law is sufficient to abate any such conditions and it becomes your duty, as, by virtue of your office, you are the local board of health, to be vigilant in protecting the interests of your town and those who may choose it for a temporary residence during the summer months.

Herewith is transmitted an order relative to the nuisance under consideration.

Respectfully yours,

IRVING A. WATSON,

Secretary and Executive Officer State Board of Health.

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Aug. 12, 1885.

Board of Selectmen, Campton, N. H.:

Sirs:—By virtue of the power vested in this board by the laws of the state, you are hereby authorized and directed to prohibit one Freeman C. Smith from slaughtering animals upon the premises where he now resides, and from the further use of his stable as a slaughter-house. You are directed to serve a notice upon him to this effect within forty-eight hours after the receipt of this order, and report to this board the time of serving such notice.

Per order.

IRVING A. WATSON,
Secretary and Executive Officer State Board of Health.

The order was sent to the selectmen because they constituted the board of health of the town. Immediate action was taken, as will be seen by the following report upon their action:—

CAMPTON, Aug. 13, 1885.

To the State Board of Health:

We have this 13th day of August, 1885, served notice on Freeman C. Smith not to use his stable as a slaughter-house from this date, as directed.

C. W. PULSIFER,
A. P. ROWE,
D. B. PULSIFER,
Selectmen of Campton.

Subsequently information was received from the town showing that the nuisance had been abated.

INSUFFICIENT DRAINAGE.

Complaint was also made to the board that a ditch which drained a locality in the rear of the post-office and other buildings, and which passed under a portion of the schoolhouse yard, was not sufficiently deep at the latter point to drain the locality mentioned. Accompanying the complaint was the following document:—

We, the undersigned, very respectfully beg leave to say it is our opinion that the ditch in rear of J. W. Morrison & Son's buildings, and in rear of other buildings in Campton Village, has been the cause of typhoid fever and other sickness, and requires immediate attention.

A. D. MUCHMORE, M. D.
WM. A. SMITH, M. D.
J. LANCE, M. D.

CAMPTON VILLAGE, N. H., Aug. 18, 1885.

The following letter was sent to the selectmen of the town :—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Aug. 14, 1885.

Board of Selectmen, Campton, N. H. :

Gentlemen :—A petition has been presented to this board, signed by A. D. Muchmore, M. D., Wm. A. Smith, M. D., and J. Lance, M. D., representing that a ditch in the rear of J. W. Morrison & Son's buildings has been the cause of typhoid fever and other sickness in the vicinity, and asking that the matter be given proper attention.

At a recent visit to Campton Village, Dr. Conn and myself made a hasty and casual inspection of the locality. It seems that some twenty or more years ago a covered drain was constructed through the schoolhouse yard to carry off the water that naturally ran through the yard. This drain, so it is said, is not deep enough to carry off the water that comes down above it, but acts as a dam, and thus prevents the thorough drainage of the locality mentioned in the petition. Whether this is the fact, or whether the drain is partially filled and thereby causes the water to stand in the rear of the buildings named, we have no further knowledge than is stated above.

It is evident, however, that something should be done at once to better drain this locality. It would be a town improvement which the selectmen ought to make, and we therefore recommend that your board cause this place to be drained as soon as may be convenient. That its existence is dangerous to the health of the people of the vicinity is shown by the highest medical authority of your town, and we trust you will deem it an official duty to take immediate measures to abate the nuisance.

Respectfully yours,
IRVING A. WATSON,
Secretary.

We were informed by a letter from J. A. Morrison & Son that the selectmen examined the locality and indicated a willingness to reconstruct the ditch if they should receive a direct order from the State Board of Health to do so. As there was a question as to who should pay the cost, the town or the district, litigation might possibly follow which, in the event of a direct order, would involve the board, so it was thought best not to issue such an order. Under the circumstances the selectmen did not feel willing to act upon their own responsibility. The board deemed it unnecessary to issue such an order for the reason that the drainage of the locality was provided for under the law passed in 1883 (Pamphlet laws, chapter 108), giving the selectmen full power to act in the matter. We are not informed that any alteration in the condition has yet been made. We would recommend that the selectmen at once cause the ditch to be deepened and enlarged where it passes under the schoolhouse yard, so as to completely drain the locality above.

HEDDING CAMP-GROUND.

The following communication was received from the secretary of the Hedding Camp-Meeting Association:—

EAST EPPING, N. H., Aug. 12, 1885.

IRVING A. WATSON, M. D., *Secretary State Board of Health, Concord, N. H.:*

Dear Sir:—There are some sanitary questions connected with the Camp Ground at this place that have long troubled the managers. We have given no little time and study to the matter the present season. We are not sure of the course we ought to take. It occurs to us to ask you to make your visit to this ground *now*, hoping you may be able to tell us what can and should be done. Could you not make your official visit to-morrow or next day?

We have a pleasant ground and greatly desire to preserve all natural advantages thereof and add to the attractions and the value every year. We shall welcome you and your suggestions. Hoping soon to see you and to show you the ground and tell you of our difficulties,

I am, yours truly,
OTIS COLE,
Secretary Hedding Camp-Meeting Association.

Immediately following the receipt of this letter the secretary visited the locality and found that it was necessary to inaugurate considerable sanitary work in order to remedy conditions which, if not already, were liable to become a public nuisance.

The officers of the association indicated a willingness to carry out all the suggestions as rapidly as possible. The following letter was transmitted to the executive committee of the association, and shows the most important changes that were urged upon the association :—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Aug. 18, 1885.

To the Executive Committee Hedding Camp Ground Association, Epping, N. H.:

Gentlemen :—After an official examination of your grounds on the 14th inst., I have the following suggestions to make in reference to the sanitary improvement of the locality, and which seem to be important for the continued healthfulness of your beautiful grounds :—

1. The line of privies, public and private, situated on the border of the swamp and over the little stream which runs through the same, should be removed so that a dry earth system of care can be used. This is essential from the fact that the stream over which they now stand is much too small to serve as a sewer, and the result is the low land along the borders of this little stream is, and will continue to be, polluted to an extent that is liable to be detrimental to the healthfulness of the place. The change can readily be made by moving the privies up the bank a few feet, enough to leave a driveway behind them, and by the use of dry earth daily they can be kept in an entirely safe and unoffensive condition.

2. Another marked improvement, and which would probably be a profitable one in the end by reason of the fertility of the soil, is suggested, to wit: that the swamp be cleared of the now quite dense undergrowth so as to let in the sun and give free passage to the prevailing winds. This is simply a suggestion which, perhaps, is not a sanitary necessity, but which would undoubtedly become a factor in adding still further to the comfort and beauty of your grounds.

I take pleasure in commending the excellent sanitary condition that is to be observed among the two hundred and fifty cottages which are so neatly scattered among the beautiful trees of the grove. Nature has done much for your grounds, in providing a clean, dry, and porous soil to build upon, and an abundance of sweet, pure water from several copious springs.

It is only man, with all the attributes of a so-called civilization, that defiles and renders noxious some of the most beautiful works of nature, and, but for the exercise of such care as experience has demonstrated to be essential to health and happiness, irretrievable disaster would follow. This is applicable to your grounds. You must constantly be on your guard against sanitary sins which, not unlike other sins, are sometimes insidious in their methods of progress. A camp-ground with so large a population as yours, should be under the daily inspection of a sanitary police, who should be faithful and just in the performance of his duty and in the enforcement of the rules and regulations which are prescribed for the locality.

With these suggestions carried out in a faithful manner, the past and present healthfulness of the place would not only be maintained but it would be impossible for any of the so-called filth diseases to get a foothold in this little village in the woods.

Respectfully yours,

IRVING A. WATSON,

Secretary and Executive Officer State Board of Health.

The improvements suggested have in a large degree been carried out, further improvements will be made the present season. It is the desire of the managers of this camp-ground to secure and maintain the best possible hygienic conditions. The locality is a delightful one, and nature has done much to render the place attractive. After the proposed improvements are made no possible fault can be found with any of the sanitary arrangements, if that degree of attention and care is secured which should be exercised at all public resorts.

LANCASTER SEWERAGE.

About the 1st of August the secretary was informed by some citizens of Lancaster that one of the sewers in Main street was broken or otherwise obstructed, so that the sewage backed up and overflowed into the cellars and basements of some of the buildings, and that this condition had existed for some time. The citizens were considerably alarmed lest such a condition should cause an outbreak of typhoid fever or some other disease. It was also stated that the attention of the selectmen had been called to the situation, and that they were going to repair the sewer "after haying," or at some other convenient time. The board of health was notified as follows:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Aug. 3, 1885.

To the Board of Health, Lancaster, N. H.:

Gentlemen:—In relation to the question of better drainage in your village and concerning which, in addition to the facts verbally expressed by some of the members of your board, complaints have been made by several citizens of Lancaster to this board, we advise the following after due consideration of the facts as presented, to wit:—

Your board should take measures to re-open the closed sewer in Main street *at once*. This ought to have been done before, and the town authorities by so great a delay have not only neglected a duty, but have, by such inaction, rendered the town liable to suits for special damages by any one who has been damaged thereby, as well as jeopardized the health of the people in the buildings which suffer from the closed sewer. Cellars into which sewage has flowed, as in this case, by reason of an obstructed sewer, render the buildings above dangerous in the extreme to the health of occupants, and constitute a nidus from which an epidemic might be started that would entail much sickness and loss of life in the village of Lancaster. Especially dangerous is such a condition of affairs at this season of the year, and no circumstance or chain of circumstances can palliate the fact that there would rest little short, if any, of a criminal responsibility upon your board if you allow the matter to remain another day without action. Notify your selectmen to repair the sewer immediately that the nuisance may be abated. They will doubtless be ready promptly to serve the interests of the town in this matter when the importance of the case is presented to them.

After the repair of the sewer, the cellars which have received the overflow sewage should be thoroughly cleansed and disinfectants used to render them pure and sweet.

Regarding other nuisances in your town, you are instructed to abate such as are brought to your notice, calling to your aid, if need be, the arm of the law, which is sufficient to meet any case that is likely to come within your province. The health and comfort of the people are a paramount necessity in all communities, and as officers of the former, without which the latter cannot be maintained, it becomes your duty to act promptly and with decision in all matters pertaining to the public health.

Per order.

IRVING A. WATSON,

Secretary and Executive Officer State Board of Health.

As no report has been made, we have no official information as to what was done by the selectmen or local board of health in the matter. We have been informed incidentally that the sewers have been put in good condition, and that there is now no trouble with the drainage.

NUISANCE AT BEDFORD.

BEDFORD, N. H., June 27, 1885.

IRVING A. WATSON, *Secretary State Board of Health:*

Dear Sir:—We, the undersigned, residents of Bedford, living on the River road, south two and one half miles from the city of Manchester, would respectfully call your attention to a nuisance now existing near the public road, and within a few rods of our homes.

Said nuisance consists of a soap-house and piggery, where quantities of putrid meat, old bones, and now and then a dead animal, are tried out. At times the smell is so offensive our doors and windows have to be closed; and to make the matter still worse, a night-cart has been run all through the spring and up to a few days ago, dumping the contents near the road and very near our houses.

Now, doctor, we kindly ask you to give this complaint your earliest attention, as what used to be one of the pleasantest places to live outside the city is at times disagreeable and must be very unhealthy.

Very truly yours,

WARREN G. CURRIER,
EDMUND B. HULL,
R. D. CURRIER,
THOMAS J. WIGGIN,
J. C. GILMAN,
E. P. FRENCH,
G. E. LANGLEY,
MELVIN KILTON,
N. B. HULL,
E. F. BUSWELL,
S. W. DUNBAR,
G. F. PUTNAM.

The president and secretary visited the locality and immediately communicated with the selectmen as follows:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, July 1, 1885.

Selectmen of Bedford:

Gentlemen:—A petition signed by the following named persons, to wit: Warren G. Currier, Edmund B. Hull, R. D. Currier, Thomas J. Wiggin, J. C. Gilman, E. P. French, G. E. Langley, Melvin Kilton, N. B. Hull, E. F. Buswell, S. W. Dunbar, and G. F. Putnam, has been presented to this board, setting forth that a nuisance exists in the vicinity of the homes of the petitioners, in the form of a "soap-house and piggery, where quantities of putrid meat, old bones, and now and then a dead animal, are tried out," and praying for an abatement of the same.

The president, Dr. G. P. Conn, and the secretary visited the locality yesterday, June 30, and found the establishment complained of to be a self-evident nuisance. The premises are said to be leased to one Patrick Ahearn, and the property said to be owned by Lewis Rice and Lucy P. Rice. The premises were found to be in a most fifthy and slovenly condition, and the rooms in which the rendering process is carried on, as well as an adjacent storeroom, were almost intolerable from the decaying animal matters, consisting of putrid masses of so-called "soap-grease," old bones, etc. Adjoining these rooms, with the exception of a narrow and filthy intervening passage-way, was a lot of swine, while underneath the building were several more hogs. The stench from this condition of affairs was almost unbearable, even at quite a distance from the building in the line of the prevailing wind. A few rods from this building, leased to the same party, is a set of buildings consisting of house, L, and stable. Under the latter was found a lot of hogs kept in a most filthy condition, and within thirty or forty feet of one of the complainants.

The two places thus described are nuisances from more than one standpoint.

1. They are a source of danger to the health of the petitioners and their families.

2. They are prejudicial to the comfort and happiness of the residents of that locality, as well as to persons traveling in the highway.

3. They must, if continued, impair the valuation of property in that vicinity, thereby not only affecting the petitioners, but reducing the taxable valuation of the town.

We therefore advise your board to cause the nuisance to be immediately abated. Chapter 111 of the General Laws gives you full authority to act in this matter. Under common law an abatement of the nuisance may be secured by an injunction. A suit for special damages could, in the opinion of the board, be sustained.

Respectfully yours,

IRVING A. WATSON,
Secretary.

On the day of its date the following communication was received, which shows that the situation had not been materially improved, although some pretence had been made in that direction by the proprietor :—

MANCHESTER, N. H., July 20, 1885.

IRVING A. WATSON, M. D., *Secretary New Hampshire State Board of Health :*

Dear Sir :—At the request of my neighbors I write you again in regard to our Bedford nuisance. The following week after your visit the selectmen made a call on Mr. Ahearn, and in about one week more Mr. Ahearn moved one soap-kettle out under a tree, also a flock of small pigs and one hog back under the hill; the hog he took from the barn near my house, leaving the others. He has banked the barn with sand and put some pine leaves in the pen, but when the hogs root over the manure and are fed the *sour city swill*, the surroundings are not much better than before. The soap team makes its regular trips to and from the city, and as smoke has been seen but once from the kettle out under the tree, we all know by the *same old stench* where the soap is made. Not so much in the daytime but more at night.

Mr. A. has no building under the tree, and the contents of the cart from the city are unloaded into the soap-house as usual. Mr. A. was a good deal disturbed after your visit, and quite cross at me for not letting him know of your coming.

This is the best statement I can give you of what has been done or what has not been done. If you would like to know more I would refer you to W. G. Currier or T. J. Wiggin. Thanking you for your kindness so far,

I am, yours truly,
E. B. HULL.

The following letter was received on the day of its date :—

BEDFORD, Aug. 13, 1885.

DR. IRVING A. WATSON :

Dear Sir:—In answer to your letter of August 12 we say, as regards the nuisance, it still exists in full force. All seems to remain about the same as I informed you in my last letter. The hogs are still under the barn, but some have been taken from the soap-house. Last Monday was one of the worst days we have ever experienced from it; the smell was almost intolerable. We think taking the swill from the soap-house and leaving it all open out in the field does not improve the matter in the least.

We are, very truly yours,
EDMUND B. HULL,
W. G. CURRIER,
T. J. WIGGIN.

On August 17 another communication was sent to the selectmen, calling their attention to the immediate necessity of abating the nuisance, and the fact that such a business could not be carried on where it was without being a public nuisance, and they were directed to cause its abatement.

In an interview with the selectmen they stated that the nuisance should be done away with without further delay. No official report has been received from the board concerning the matter, but as no further complaint has been made, it is presumed that the nuisance has been abolished. The business will not be allowed to be carried on at that place in the slovenly and offensive manner in which it has been conducted in the past.

THE NASHUA WATER SUPPLY.

Some apprehension was felt early in the season because the Nashua water contained so large an amount of vegetable matter which was developed in the storage reservoirs, lest it might be the cause of sickness during the summer months. By invitation of and in company with the mayor of the city, the secretary inspected the several storage ponds from which the city water is received.

It was thought best to have an analysis of the water made, taking the samples from the water pipes in the city. Two specimens were examined,—one by Prof. E. R. Angell, and the other by Prof. Edward S. Wood, of Boston, Mass. Upon the receipt of the reports upon the analyses made, the following was transmitted to the mayor of Nashua :—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Aug. 18, 1885.

HON. JOHN A. SPALDING, *Mayor of Nashua :*

Dear Sir :—The delay in reporting to you the results of the analysis of the samples of Pennichuck water, one of which you sent to Prof. E. R. Angell and the other to me, was from the fact that I did not obtain a report on one of the samples until yesterday. The specimen sent me I forwarded to Prof. E. S. Wood, of Harvard College, for examination. Prof. Angell reports as follows :—

SANITARY ANALYSIS OF WATER FROM NASHUA.

Odor	Not perceptible.
Color	Yellowish.
Total solids, grains per gallon	4.2
Ignition of residue	It blackens some.
Volatile and combustible matter	1.5
Hardness, equivalent to grains of CaCo	2.0
Alkalinity, " " "	1.5
Chlorine, grains per gallon	0.2
Ammonia, parts per million :—	
Free ammonia	0.02
Albuminoid ammonia	0.132
Nitric acid	None.
Nitrous acid	None.
Iron	Strong trace.
Lead	None.
Sediment	Considerable.

Microscopic examination,—silicious particles, aquatic plants, infusoria.

EXPLANATION AND OPINION.

The color of this water is due to the aquatic vegetation, which has a yellowish color. When the water is evaporated to a small quantity, it becomes frothy and somewhat syrup like, which indicates the presence of vegetable matter. The loss on ignition is comparatively large, as all the solid matter amounts to only 4.2 grains per gallon. Most of the loss is organic matter. The small amount of free ammonia shows that decay is not very active at present, but the amount of albuminoid ammonia indicates the presence of considerable organic matter. The microscopic examination confirms this, showing quite a quantity and variety of fresh water algæ; the prevailing types are confervaceæ, desmidiaceæ, diatomaceæ, pediastraceæ and apiocystaceæ. The animal life is confined to the class infusoria, several orders of which are present. This water contains too much vegetable matter.

EDMUND R. ANGELL.

DERRY, N. H., Aug. 3, 1885.

The following is Prof. Wood's report:—

BOSTON, Aug. 13, 1885.

WATER ANALYSIS.

(Figures express parts per 100,000 of water.)

Free ammonia	0.0004
Albuminoid ammonia	0.0098
Chlorine	0.20
Residue:—	
Fixed	3.20
Volatile	2.50
Hardness	1°
Transparency	Clear.
Color	None.
Odor	None.
Characteristics on Ignition	Considerable blackening.
Nitrates	Absent by ferrous sulphate test.

This is an excellent water. There is no evidence of injurious contamination. The water is suitable for drinking and other domestic purposes.

EDWARD S. WOOD.

So far as the analyses go, there is but one conclusion in the case, and that is that the water taken at that time (July) was not dangerous to use for domestic or other purposes. It is a question, however, to what extent an analysis can determine the healthfulness or purity of water. Of course it shows the amount of organic or inorganic matter, and but very little beyond. Just what effect a water filled with certain forms of plant life may have upon the human system when used daily, is to be determined only by observation. In the instance of the Pennichuck water, I have yet to learn of any sickness traced to it this season. Moreover, the mortality reports of your city, if the newspapers correctly report the same, indicate an unusually small death rate for July.

I do not see as there is any ground for further action on your part, or on the part of this board, unless as the season advances some evidence of ill effects from the use of your city water is observed. I think it would be well for you, in your official capacity, to give the matter such attention as may be necessary to keep you informed regarding the healthfulness of your city, and should any developments show, or indicate, that a deleterious effect is being produced by the Pennichuck water, we will gladly make a further investigation of the subject.

Respectfully yours,
IRVING A. WATSON,
Secretary.

The Pennichuck Water Company has expended a large amount of money during the present year to secure a good water supply for the city. They have greatly enlarged the reservoir from which the city supply is directly taken. The old reservoir held 600,000 gallons; the new one has a capacity of 3,800,000 gallons, and is built of stone in a very substantial manner. It is circular in form, and has an average depth of fourteen feet of water. It will probably be necessary for the company to exercise a great deal of care in relation to the artificial ponds in which the water is stored, especially the upper pond, to keep the vegetable growths within a limit that will not render the water unhealthy. There is an especial liability to the development of a large amount of vegetable matter in the latter pond during a very dry and warm season.

SANITARY INSPECTION OF RAILWAY STATIONS AND GROUNDS.

Early in the spring of 1885 the State Board of Health commenced a sanitary inspection of the stations and grounds of the different railroads in the state. The object of this work was threefold, and may be stated thus:—

1. The health and comfort of the traveling public.
2. The interests of the railroads themselves.
3. The interests of the state as a summer resort.

The necessity for such a work became apparent from a review of all the circumstances embraced in the statements given above, rather from a combination of them all than from any one individually. The traveling public, especially that class known as summer visitors, or summer tourists, have, in keeping with the advancement of sanitary science, grown more thoughtful each year of the too visible results of bad sanitary conditions, possibly hypercritical in many instances, and are demanding that the lines over which they travel and the places in which they briefly sojourn shall possess the minimum of objections in this direction. Upon the same plane has been the demand for ease and comfort while en route, and this has resulted in better cars, greater conveniences, etc., because competing lines have been obliged to satisfy their patrons. In like manner the observation of the traveler is being directed to matters exterior to the car itself while in transit. The tidiness of the station, the cleanliness of all its appointments, the beauty of the grounds, the purity of its water supply, are often critically asked about or examined. Beyond the important question of health, that of scenery, all that may please or displease the eye, is not to be ignored by the railroads or by the state. The railroad that best provides for all these things, everything else being equal, will be the best patronized, and the benefits accruing from the improved condition insure an increased revenue, not only from direct sources, but also through diminished expenditures. Sanitary rules rigidly enforced by any railroad corporation will secure better care of buildings and fixtures, and thereby greatly prolong their period of usefulness. So well has this fact been demonstrated that several railroads have added a medical officer to their list of managers, who has within his province the charge of railway sanitation as well as the other duties belonging to the office. The Grand Trunk is the only line running into this state having such an officer. The value of his services is apparent in the improved sanitary appointments of that road under such an administration.

So far as the state is concerned, the question is one not only of financial gain, but of educational, industrial, and social importance. With agriculture at a low ebb in many sections of the state, and manufacturing enterprises seeking common centers offering more favorable inducements, there is a large section of this "Switzerland of America" that is worth only what summer visitors make it. Already the annual influx of such has added much to the resources of the state, provided a local market for the produce of the locality, built churches and schoolhouses, largely increased the taxable property, and greatly augmented the prosperity of many towns. It becomes, then, the duty of the state to foster and encourage in every legitimate way the coming of visitors among us to spend the summer months.

Nature has been bountifully lavish with her gifts in New Hampshire, and it is with a view to correcting the attendant evils of civilization that sanitary supervision is exercised. A few cases of typhoid fever or diphtheria at a place of public resort is, setting aside the question of life and death, a financial calamity. We desire to leave nothing undone that will prevent such a result, and if our efforts are successful we shall have accomplished the threefold object with which this work was undertaken.

We desire to express our thanks to the railroads for the interest they have manifested in this work and for the courtesies and facilities they have extended to us. The survey of the railroads in the eastern and central parts of the state has been completed; the roads in the western portion will be inspected in the spring.

THE BOSTON & MAINE AND ITS LEASED LINES.

(Eastern, P., G. F. & C., D. & W., and Wolfeborough R. Rs.)

The inspection of the stations and grounds of this road was commenced May 15, 1885. Through the courtesy of James T. Furber, Esq., general manager, a special train was placed at the disposal of the board, which was accepted. The president and secretary of the board examined every station in New Hampshire under the management of the road. The conditions found and the work performed in each case are entered in detail upon the records of the board. A general report is here presented, but before considering the sanitary appointments there are some prominent features as well as some special conditions to which we would call particular attention.

1. The grounds of the Boston & Maine stations. It has been

a part of the policy of this road to beautify as much as possible the grounds about the stations, and to maintain a neat and attractive appearance between the fences along the line. A prize is annually given to the station agent who keeps his grounds in the best and most attractive condition. The company furnishes each agent, if desired, a certain sum for plants and flowers to beautify the grounds. So much attention has this scheme received that, although inaugurated but a few years since, the transformation is remarkable. Stations that a few years ago were rusty and untidy, with grounds growing up to weeds and bushes, are now well painted and have gardens of green, closely cropped grass, with a pleasing variety of flowers attractively and artistically arranged. At some of the stations the designs in flowers would do credit to a professional landscape gardener. The grounds at Madbury in particular may be mentioned as an example. Especial mention is made of this feature because, although having only an indirect bearing upon the health aspect of the question, it is a profitable outlay for the railroad and the state. It is in the financial interests of both, as well as for the pleasure and comfort of the traveler, that the matter is deemed worthy not only of notice but of imitation by every railroad in the state.

Again, an agent or employé who gives careful attention to the matter of having neat, clean, and beautiful grounds will have a corresponding regard for other things about the station. Dirty and unsightly floors, odorous vaults, etc., would be too grossly incompatible with an artistic exterior to be tolerated by most persons; hence these outdoor embellishments become monitors of discipline in many directions. It is the purpose of the B. & M. R. R. to extend this principle to their leased lines, and it was observed that the P. G. F. & C., and D. W. railroads have profited by the example already set them.

In making mention of conditions deserving special commendation, the general cleanliness and care of station and grounds at Madbury should not be overlooked; indeed, it should be pointed out to other station agents as an example of what can be done at almost any station along the line.

At Portsmouth the condition of the water-closets and urinals merits great praise. This is a station of considerable importance, especially during the summer, and the excellent sanitary conditions which it possesses are a great credit to the station agent as well as to the road, and are fully appreciated by the traveling public.

Out of the fifty stations examined, only four were classed as "bad" regarding sanitary conditions. These were Newmarket Junction (the responsibility of which is equally divided with the the Concord Railroad), Durham, Great Falls, and Rochester. At Great Falls and Rochester improvements were being considered.

The condition of four stations was classed as "fair," and the remaining forty-two as "good." This, as a whole, shows a careful consideration of the question of railroad sanitation by the management of this road and its leased lines. Twenty-two stations are supplied with water, fifteen from wells and the others from springs and public supplies. Families reside in only eight out of the fifty stations examined.

The stations are provided with water-closets or privies, with five exceptions only, and these are small and unimportant flag stations. Thirteen stations have one privy each; twenty-two have two each; one has four, and one six. Seven have water-closets, and one (Salmon Falls) a latrine. Urinals were found in fifteen stations, and as a rule were in good condition, although such cannot obtain without a great deal of care.

Nine stations were found with good sewers, about the same number with cesspools, usually unobjectionably located, and the remainder with surface drainage only.

Twenty-six agents use disinfectants of some kind whenever needed about the station. Disinfectants are furnished free of expense by the company. A close inquiry as to whether complaints had ever been made of bad sanitary conditions at the station elicited only three answers in the affirmative.

The latrine at Salmon Falls above mentioned is in many respects superior to vaults or modern water-closets. It has, in the place of the vault, a tank of water which can be flushed out into a sewer daily, or as often as circumstances demand. The tank is, of course, connected with a water supply, so that it immediately refills. This system is in use in two or three other railroad stations in the state, as well as at the state house, and in some of our public school buildings. It possesses the great advantage of being odorless and not requiring the constant supervision of some one to keep it in good order, as is the case with water-closets.

Viewing the sanitary appointments of this road from a general standpoint, we will say that they are to be commended for their general excellence.

The suggestions which were given agents and superintendents, looking toward further improvements, were received with a cordial expression of gratitude and an evident willingness to carry them into effect.

WORCESTER, NASHUA & ROCHESTER RAILROAD.

(Leased to the Boston & Maine Railroad.)

All the stations of this road in the state were inspected in May. Much praise may be given in a general way for the neatness and convenience of these stations, and they might be looked upon as models of their kind for other roads. Nearly all have two waiting rooms, with the appointments of each well arranged and in good condition.

Of the fourteen stations on this line, nine are supplied with water,—six from wells and three from other sources. With two exceptions the supply was found to be good. At Windham Junction the water was wholly unfit for drinking purposes, and a new source should be obtained. At Lee, the well is in danger of pollution from the cesspool, which is not over thirty feet from it. The well is only twelve feet deep, and on a line of drainage from the cesspool. This matter should receive the attention of the company.

Five stations are supplied with modern water-closets, which were found in excellent condition. At Nashua a latrine had been substituted for the old water-closet and was found to be very satisfactory, except that it was not sufficiently ventilated. The agent was instructed on this point and exhibited a desire to remedy the defect immediately. The remaining stations have privies, most of which were found in good order. That at Hubbard's (a small flag station) was in a bad condition. All the stations having water-closets were sewered to cesspools averaging, probably, a hundred feet distant, and were well cared for. The few defects found were mentioned to the agents and a reform promised.

The plumbing was unusually good for small railway stations. Set washbowls exist in several instances, a luxury seldom found in small stations. The general conditions are most commendable.

CONCORD RAILROAD.

An inspection of the stations of this road was made by the president and secretary of the board. In keeping stations in a proper condition more depends, as a general rule, upon the agent than upon the company. At some stations the sanitary conditions were most excellent, while at others, having facilities almost precisely the same, a lax state of affairs existed. Such instances show the difference in the oversight and attention to detail manifested by different agents. In cases where the company has neglected to make adequate provision for a given requirement, the agent is not to be blamed, and the criticism should fall where it belongs.

Of twenty-seven stations, exclusive of Manchester, Epping Junction, Newmarket Junction, and Windham Junction, which will be elsewhere considered, families resided in four.

Six stations were supplied with water from wells, three of which seemed to be in danger of pollution from the surroundings. These were Greenland, Pittsfield, and Salem. One station was supplied from a spring, one from a pond, and one from the engine supply. The majority of the stations had no water supply whatever. At many of these stations a water supply is not absolutely required ; but at a station of any considerable size, or to and from which there is much travel, it is necessary. It is better, however, that no such provision should exist than to depend upon shallow wells located so near the vaults as to be polluted, as is not infrequently the case.

Water-closets were found at six stations, privies at twenty-four. Of the latter seventeen were classed as " good," five " fair," and two, Newmarket Junction and Salem, in a bad condition.

Of the twelve urinals, six were good, three fair, and three bad. At most of the stations there is a surface drainage only. At a few stations disinfectants would have greatly improved the sanitary condition. The company should furnish each agent with chloride of lime or some other good disinfectant, to be used when necessary. This rule should be adopted by all railroad companies.

At Newmarket Junction, jointly controlled by the Concord and the B. & M. R. R., the privies were in a bad state, and cannot be otherwise as now located. This is an important station, especially during the summer months, and better sanitary provisions are demanded at once. The condition was disgusting during a larger part of the season.

At Windham Junction, the water supply is wholly unfit for drinking purposes. At Epping the water-closet was in a foul state; proper care had not been given it. The water which flushes the closet has to be pumped by hand into the flushing-tank, and it was evident that the tank was not always kept supplied.

At Manchester, a filthy condition of the gents' closets and urinals was found. The drainage is inadequate, and the sewer pipes said to be broken under the station. The room has not received even ordinary care, and was foul to an inexcusable degree. Alterations are said to be contemplated that will abate the existing nuisance.

While the above criticisms are made for the purpose of securing improvements, we are not unmindful of the work that is done every year by this corporation to benefit the public, as well as to add to the valuation of its property.

A magnificent station has been erected at Concord, which is of great credit to the company and a valuable addition to the taxable property of the state. It is elegant in all its appointments and furnishes the traveling public with all the comforts that are possible in a railroad station. Its sanitary appointments are of the best in all respects.

Several new stations have been erected on the Weare branch, and others are to be built soon. Improvements and alterations are proposed in other stations.

We have no doubt that the sanitary defects mentioned will be remedied as fast as possible.

BOSTON & LOWELL RAILOAD.

The sanitary conveniences and conditions of the stations on this road have been slowly improved from year to year, but at no time has it been more marked than within the past year. The fact that a very large amount of travel goes over this road and its branches during the summer months, carrying as it does thousands of visitors and tourists to the mountains, renders it necessary that these matters should be taken into careful consideration; and the management of the road has not been unmindful of these requirements. Many of the stations in the mountain region are new, or comparatively new, and some of them are models of beauty and structure, divided into two waiting-rooms, supplied with modern toilet-rooms, and with running water from springs. While a large proportion of the stations were found to be in a very excellent condition, some require immediate improvements and alterations. The following are some of the points which may be especially mentioned as demanding the attention of the company:—

At East Concord, the general condition of the station was most excellent, with a good supply of water from a spring. The vaults were in excellent condition, and a large sewer pipe for ventilating purposes enters the chimney from the vault, thus insuring excellent ventilation. The waste water from the set basin in the gentlemen's room is discharged under the building and stands upon the surface or percolates into the soil. At the present time no perceptible odor arises, but it will eventually become a nuisance, besides largely contributing to the decay of floors and timbers. This should be changed.

At Tilton, the station was found to be in a very good condition with one or two exceptions. Direct-pressure water supply is used in the closets, and it is not sufficient to flush them properly; there is a tank, and it should be used instead of this method. The sewer runs from the station to the river, but one or two lengths of pipe should be added in order to carry it beyond low-water mark. A gas machine and a steam-heater were found in the cellar, within a few feet of each other and without a brick partition between them. Query: Is there any danger under the existing circumstances? The cellar is very damp by reason of a spring or well that keeps it constantly wet; this should be changed, either by drainage or by thoroughly cementing the cellar bottom, in order to protect the building from decay, as well as to render it more healthful.

At Lake Village, the station consists of two good waiting-rooms and offices in the basement of a large, well-finished building, and is kept in good order. The present water supply, pumped from the river, is in danger of pollution. The town, however, has put in a large water supply, taken from the bay above the village, where there is not the least danger of pollution. It would be well for this station to abandon the present supply and connect with the town works as soon as they are completed.

At Weirs, a large building has been added to the old station, extending back over the lake, and fitted up as a station and a public restaurant. This is a very fine building for the locality, and its sanitary appointments are first class. It is fitted up with modern water-closets, and is connected with the iron sewer which carries all the waste from the sinks as well to a point down the lake near the outgoing current, so that the water in the vicinity of the station and camp-ground is not polluted as it formerly has been. This is a very great sanitary improvement for the locality as well as for the station. The company have put out considerable money for the purpose of securing the best possible sanitary conditions for the place. The water supply is pumped from the lake at a point free from any liability of contamination. A large water tank for the engines has also been constructed, and from this a supply is taken for the closets in the new station.

The importance of maintaining good sanitary conditions is not greater at any point in the state, for the reason that many thousand persons annually visit the Weirs. Some own cottages there, while camp-meetings, conventions, and other public meetings call many others to the place. The company is to be congratulated upon the work it has done and the efforts it is constantly making to keep this place of resort in a first class condition in all respects.

Among the more prominent mountain stations may be mentioned Lisbon and Littleton, both stations being in excellent condition. At the Wing road some improvements should be made; in fact, a new station will probably be required in the near future. During the season a large number of people stop at this station for a few moments at least, in changing cars or in waiting for trains. It consists now of but one waiting-room; it formerly had two, but the other is now used as a dining-room. The ladies' toilet-room is entered though this dining-room. The gentlemen's closet is entirely inadequate for the station. The station has no water supply.

At Bethlehem Junction, there is a very fine station, well designed and first-class in all its appointments. At Fabyan's, the station accommodations are entirely inadequate for the place. A brief report of the condition was made to C. S. Mellen, Esq., general superintendent, in July, which called his attention to the existing defects. The station contains no water-closets or privies, and is altogether too small for the place. The "Cottage," a building belonging to the company and used for sleeping accommodations for the train men as well as for the help at the Fabyan House, was found to be in a very bad condition. The cellar was wet and without drainage. The sanitary conditions were bad, and the lower part of the building was in a state of general decay.

By appointment, the examination of the premises, as well as of the station, was made by the president and secretary of the board, with Mr. W. A. Stowell, division superintendent, and a plan of improvements considered. The company already had in contemplation the remodeling of these buildings so as to make them more convenient, and also to improve the sanitary conditions of the same.

It may be stated at this writing that much work has been done, and that before the season of 1886 opens many of the improvements contemplated will have been completed.

These are the chief defects that have been discovered in making a sanitary inspection of the stations upon this popular line of travel. Much might be said in praise of some of the stations that are not mentioned, and still more in behalf of the policy of the company, which seems to be to place everything pertaining to the road and to the places of public resort along its line in the condition best calculated to satisfy the traveling public and to protect their health.

The board desire to express their thanks for the courtesies received from this company.

NORTHERN DIVISION B. & L. R. R.

A systematic inspection of this line was not made during the past year, but will be during the present season. Some of the stations, however, have been examined, and were found to be on an average with the stations of other lines. We also had the pleasure of noting some improvements that had been made during the year. The stations upon the Southern Division of the road will also be inspected the present season. A partial inspection has already been made.

GRAND TRUNK RAILWAY.

The sanitary conditions of this line of railway are under the management of a medical officer, this being the only line running into the state that has such an official. Prior to the inspections inaugurated by this board, the medical officer of the road had issued a circular to agents, making it compulsory upon the latter to maintain good sanitary conditions, giving explicit directions, and notifying each agent that disinfectants would be furnished upon a requisition from them.

As a rule, the stations were found to be in a good condition. Among the stations which may be especially mentioned are Gorham and Berlin. At the former the sanitary arrangements were being entirely remodeled, and a sewer was in process of construction from the station to a suitable distance therefrom. At this station there has been constructed a latrine, and the sanitary appointments in all respects are first class.

At Berlin, a new station has recently been built, and at the time of inspection everything was in excellent condition and order. The inspection of this line, as well as that of all the others, demonstrates the fact that some system of vaults should be constructed where it is not possible to obtain water carriage that will prevent the pollution of the soil. In an interview with the agent of this company, he stated that in the building of many stations some excavation of the earth beneath the buildings was generally made; the result has been that water from rains and melting snow frequently finds its way into these excavations, carrying with it, in solution or otherwise, considerable of the waste products that are deposited upon the ground where there are no vaults to the closets. Extensive soil pollution follows, and after a few years the odor that comes from this source alone is noticeable, and in some instances nearly intolerable, especially at night when there seems to be greater evaporation from the soil. At one station, of which this agent had knowledge, the contaminated soil was removed to quite an extent and fresh earth substituted, yet the offensive odor was still noticeable in the evening.

Another feature in the sanitary administration of this railway, and one which ought to be required by the laws of the state, is that every station has a closet suitably arranged for both sexes. Much well-grounded fault has been found because so little attention has been given to this necessary adjunct of every well-regulated station by many of the railroads of the state. The agents upon this line are held responsible for the enforcement of all sanitary regulations.

INSPECTION OF SUMMER RESORT HOTELS.

The sanitary inspection of the principal houses of summer resort was commenced during the year, and will be continued from time to time as is deemed necessary. Owing to other work which was being carried on by the board, it was not possible to make an inspection of all the summer hotels during the year. Below will be found a brief report upon the sanitary condition of most of the houses inspected:—

It may be said incidentally that the owners or proprietors of the houses visited expressed their appreciation of the work, and indicated a desire to place their buildings and grounds in the best possible condition with reference to the health of their guests. Indeed, the proprietors of the larger and more prosperous public houses have long recognized the importance of a good sanitary administration, and that without such it is impossible to secure first-class patronage.

The conditions found are given in the report for the purpose of furnishing information to those who desire to consult the same, and also to insure vigilance on the part of the landlords in maintaining a good standard of hygienic requirements.

In a few instances reports have not been made, because the premises were undergoing alterations tending greatly to improve the general conditions of the same, and it was thought best not to make a report until such improvements had been completed.

Whenever it was found necessary to make suggestions pointing toward certain essential improvements, the interested parties have, in every instance, manifested a willingness to comply with the suggestions offered. In the reports given, it has been our aim to be strictly impartial so far as location or ownership were concerned, and any degrees of comparison that may be discovered, are based solely upon our views from a sanitary standpoint.

WAUMBEK HOUSE, JEFFERSON.

This house is situated at an elevation of one thousand five hundred and sixty-four feet above the level of the sea, and is delightfully located. It contains one hundred rooms; eighty in the house proper and twenty in the annex. Considerable money has recently been expended to put this house in a perfect sanitary condition. The inspection of the same revealed the most scrupulous care and cleanliness in all its appointments. The sewer is carried two thousand feet to a brook. In the construction of the sewer and in the plumbing of the house the most modern principles were recognized. The soil pipes extend through the roof of the house and secure perfect ventilation for the sewer. All the connections with the latter are well trapped. The house also is well ventilated, even to the kitchen. The present proprietor, Mr. Charles Hartshorn, has spared no pains to make the sanitary appointments of this house first class in all respeets.

The water supply is from a spring upon the side of the mountain, beyond any source of pollution. The house is supplied with modern water-closets with a large flush of water, and apparently in perfect condition.

STARR KING HOUSE, JEFFERSON.

This house is situated just below the Waumbek House, and like all houses upon Jefferson hill, commands a fine view of the valley below. It contains thirty-one rooms. The water supply is from a spring upon the mountain-side, and is abundant and pure. The privies are disconnected with the house and are flushed with a large amount of water from a brook. The sewage is carried down the hill a long distance from the house and beyond any point of danger. The general sanitary conditions are good.

PLAISTED HOUSE, JEFFERSON.

This house contains fifty-three rooms. The water supply is from a spring upon the mountain-side above all buildings or other sources of pollution. It is brought to the buildings in wooden and iron pipes. The sewage is carried a long distance from the buildings. This house contains modern water-closets in good condition and flushed with an abundance of water. The sanitary appointments are first-class.

LANCASTER HOUSE, LANCASTER.

This house is very pleasantly located in the village of Lancaster, and sufficiently elevated to render its site dry and healthy. It contains seventy-five sleeping-rooms. The house is comparatively new, having been built only four or five years ago. It is provided with running water from a spring. The house is heated by steam, lighted with gas, contains modern water-closets, and is thoroughly sewered. The sewer runs to the river, some fifty or sixty rods distant, and is connected with the house only. It ranks as a first-class hotel, and is largely patronized by summer visitors.

FARRAGUT HOUSE, RYE.

This house is delightfully located within a few rods of the ocean, and has ample grounds with an abundance of shade trees. It contains one hundred and eighty rooms, is supplied with an abundance of spring water from a source which guarantees its purity. The plumbing and sewering of the house are first-class in all respects. It is supplied with modern water-closets, with an ample amount of water. A sewer runs to the ocean, and all the connections are properly trapped and ventilated. All the out-houses, as well, were found to be in an excellent condition. Much care has been taken to maintain the most healthful condition possible at this house, and the general sanitary condition is excellent in all respects.

BOAR'S HEAD HOUSE, HAMPTON.

This house contains sixty-three sleeping-rooms, and has twenty-five supplementary rooms in the Granite House and cottages near by. The water supply is from a well and is pumped by wind power. The privies are disconnected from the house and dry earth is used daily. During the summer season they are cleansed every morning.

The house is pleasantly located on an elevation sufficient to insure good drainage, and if properly cared for must of necessity be a pleasant as well as a healthful summer resort.

SEA VIEW HOUSE, HAMPTON BEACH.

This is a new house, built early in the season of 1885 on the site of the one burned during the preceding winter. The house contains twenty-six rooms. The privies are disconnected from the house and are daily kept in good order by the use of dry muck. The sink drainage is into a cesspool near by ; the water supply is from a well in the yard, but should be taken from some other source, for the well, if not already polluted, is liable to become so at any time, owing to its close proximity to the privies and cesspool. All the other sanitary requirements are excellent.

SEA VIEW HOUSE, RYE.

This house contains ninety-four sleeping-rooms. The water supply is of excellent quality, taken from a spring. The water-closets were in good condition and the building is sewered to a cesspool. New plumbing has recently been put in, and many other general improvements made. There is great need of a main sewer to the ocean, which should take not only the sewage from this house, but from other dwellings in the locality. It is only a question of time, probably, when this will be accomplished; it is a matter in which the town should interest itself and at an early date take direct measures to secure it.

ALPINE HOUSE, GORHAM.

This house is owned by the Grand Trunk Railway Company. It contains fifty-four sleeping-rooms; it is pleasantly situated near the Grand Trunk depot. It is supplied with modern water-closets and sewered to a cesspool some distance from the house. It is supplied with pure spring water from the mountain-side. This house is the point of departure by stage route to the Glen House and the summit of Mt. Washington, and has each year more or less summer visitors. The house is comparatively new and ample in all its accommodations. The general sanitary conditions are good.

CRAWFORD HOUSE, CARROLL.

This house is situated on the P. & O. railroad, close by the gateway of the White Mountain Notch, and near the head waters of the Saco river. This house is supplied with an abundance of spring water from the mountain-side; the house is thoroughly plumbed and sewered, and is provided with modern water-closets. The sewer is constantly flushed by a large volume of water, taken from the mountain-side above, making in itself a stream equal in volume to a small brook. The terminus of the sewer is in a brook at quite a distance below the house. The rooms are large and airy, and the site is dry and healthful,—in fact, the house stands upon a ridge, the waters upon one side flowing into the Ammonoosuc, and upon the other into the Saco. All the outhouses and surroundings showed evidence of the closest attention to all the details necessary for the greatest cleanliness. It is with pleasure that we can say that no house in New Hampshire is better kept or provided for from a sanitary standpoint than this.

THE FABYAN.

This is one of the largest houses in the mountain region. It is so situated in relation to the arrival and departure of trains from the mountains, and especially over the Mt. Washington Railway, that during the season a great number of people stop at this house. It is situated on the bank of the Ammonoosuc river, at a sufficient elevation above the same to secure good drainage. The water supply is from the side of the mountain, and is ample for the uses of the hotel as well as for fire purposes, should a demand be made upon it. It was found upon close examination that the floor timbers of the basement in the easterly wing of the building were badly decayed. These have been removed and new timbers and floors put in their place. Other minor improvements have also been made. The location is an exceedingly healthful one, and there is no reason why its high reputation as a summer resort should not continue for years to come.

MOUNT PLEASANT HOUSE.

This hotel is located on the P. & O. railroad, just above the Fabyan, and commands a fine view of Mt. Washington. Its water supply is from the mountain-side, high above the house, and is, like the water from all the mountain springs, of excellent quality. It is well sewered, and provided with an ample amount of water for flushing the sewers. The sanitary conditions throughout are excellent.

PRECAUTIONS AGAINST SMALL-POX.

The Montreal Epidemic.

In the following pages will be found a somewhat extensive report of the work performed by the State Board of Health in its efforts to protect the state against the invasion of small-pox from the infected districts of Canada. The details of this work, including considerable correspondence touching the matter, are given for two purposes:—

1. To show the large amount of work that was done by the board, not only in performing the duties that would ordinarily be required under such circumstances, but also in its efforts to

secure more efficient protection on the various railway lines from the government inspection service.

2. To show the inefficiency of the Marine Hospital Service, from the manner in which it undertook to protect our frontier against the invasion of small-pox.

While the board had been watching the progress of the disease in Montreal during the summer, no action was taken until the 19th of August, when the following letter was transmitted as addressed :—

CONCORD, N. H., Aug. 19, 1885.

HON. EDWIN MOREY, *President B. & L. Railroad, Boston, Mass :*

Dear Sir :—The newspapers this morning report that the state of Michigan, through its executive, has asked the general government to place quarantine regulations upon the passenger and freight traffic from Canada, and from all accounts it is quite certain that small-pox is alarmingly prevalent in Montreal and other parts of the province of Quebec, and that the higher classes of citizens are far from being exempt.

Such being the case, it becomes a matter of great importance to the railroads and hotels of New Hampshire that the epidemic be restrained from coming into the state, and at the same time any effort in that direction must be made with such discretion as not to alarm travelers, else the remedy will be worse than the disease.

The state board of health of New Hampshire would be the last to unnecessarily excite public opinion; yet as other states are moving in this matter, we may be obliged to take some measures to prevent the introduction of small-pox into the state.

Having in view the best interests of all concerned, we would suggest for your consideration the advisability of arranging for all the trunk lines running into Montreal and Quebec holding a conference with the health authorities at some central point where this matter can be discussed, and necessary rules and regulations be formulated to take effect at any moment when it might become necessary to act.

In this way much valuable time might be saved, and a great deal of friction between railways and civil authorities be obviated. To do this it would only be necessary to arrange that each line should be represented by its president, or such delegate or medical officer as the management might designate, reminding them that this work must be of a confidential nature, as newspaper publicity would occasion unnecessary alarm, and be fatal to the object we have in mind.

To summarize the whole matter, it is to effect such an organization and agree upon such rules and regulations as may be used at a moment's notice, to prevent the introduction of small-pox or other contagious disease into the state, and at the same time not to interfere with the commercial or traveling relations of the public over our railways.

Believing this to be a matter of importance, we have the honor to be your obedient servants.

GRANVILLE P. CONN, *President.*
IRVING A. WATSON, *Secretary.*

To the above letter President Morey immediately responded as follows:—

BOSTON & LOWELL RAILROAD.

PRESIDENT'S OFFICE,
BOSTON, Aug. 20, 1885.

DR. GRANVILLE P. CONN, *President State Board of Health, Concord, N. H.:*

Dear Sir:—I am to-day in receipt of your favor of the 19th inst., and thank you for the thoughtful considerations expressed. The situation is entitled to, and shall receive, careful consideration and prompt action on our part in conference with the various other roads interested, for the devising, if possible, of some way to alleviate the danger with the least possible alarm to the public and loss to the corporations.

Very respectfully,
EDWIN MOREY,
President.

Mr. Morey immediately acted upon the suggestions contained in the letter which was addressed to him on the 19th, and as a result of such action, Messrs. J. Stevenson, general superintendent of the Grand Trunk Railway, A. T. MacKinnon, general superintendent of the Southeastern Railway, J. W. Hobart of the Central Vermont Railway, and George F. Todd, superintendent of the Northern Division of the Boston & Lowell Railway, met the president and secretary of the board on the 25th of August at the state house, for consultation as to what course the various railways should pursue to protect their own interests, as well as the public, against the danger which confronted them. The matter was quite fully considered, and it was decided that the management of the lines above named should at once consult with their medical officers, and if it seemed advisable, call a meeting of the medical officers and sanitary authorities to devise a system of inspection that would best serve the interests of the corporations and the public. In view of the fact that the epidemic was liable to increase as cold weather came on, it was deemed best to prepare for any exigencies that might arise, in order to meet them with the least possible inconvenience to the railroads, the commercial interests, and the traveling public. It was suggested that our consul-general at Montreal, being a medical man, might be able to give us from time to time much valuable information, and might also be of material service in other directions.

Immediately following the return of Mr. Stevenson to Montreal, the following telegram was received :—

MONTREAL, Aug. 28, 1885.

DR. WATSON, *Board of Health, Concord, N. H.:*

Mr. Hobart, of the Central Vermont, has been requested to ask you and Dr. Conn to be here Tuesday next to attend a meeting of medical men of the United States and Canada.

J. STEVENSON.

In accordance with the request, Dr. Conn and the secretary proceeded to Montreal, where a meeting was held at the office of the consul-general, at which meeting there were present representatives from all trunk lines leading into Montreal, as well as from two or three navigation companies. The whole situation was carefully considered and discussed. The inability of the city board of health to handle the epidemic was evident, and the lack of any organized authority sufficiently well armed to meet the emergency was also plainly to be seen. The following is a transcript from the records of the meeting:—

That the board of health of the city appoint a sufficient number of medical officers to inspect all passengers leaving the city by train or boat, unless provided with proper medical certificates, and prevent their leaving the city if infected.

That representatives of the transportation companies shall call upon the civic authorities and urge upon them the necessity of immediately securing the active co-operation of the Provincial, and if necessary the Dominion, authorities in everything requisite to immediately stamp out the present epidemic of small-pox in Montreal and adjoining municipalities.

That the transportation companies shall see to the vaccination of all employés connected with the handling of baggage or attendance on passengers.

That they shall issue instructions to agents to demand certificates of freedom from infection in all cases of suspicion.

Request through the public press all physicians in the city to co-operate, by giving to all their patients intending to travel a certificate to the effect that they are free from contagion.

That the transportation companies shall not ship rags, except imported rags and tailors' clippings direct from warehouses till the epidemic is over.

Dr. Covernton reported that the manufacturers of the city had formed an alliance and appointed a medical man, Dr. Ward, to attend to these duties, who vaccinated all the employés of the alliance and examined the domiciles of all the employés for this purpose.

Dr. Covernton stated that the steps taken by the authorities of the province of Ontario would be the stoppage of all trains at the border line, the transference of passengers and the return of cars to the province from whence they came, unless arrangements satisfactory to the board of health of the province of Ontario were adopted.

It was also stated that, by printed circular, the state of Michigan would adopt similar precautions; that the states of Vermont and New Hampshire would also adopt similar precautions, unless satisfactory steps were taken to insure these states against the introduction of contagion of small-pox.

It was resolved, that the board of health of the city of Montreal be requested to communicate, through the press, to the public, the action of the representatives of the transportation lines in this connection.

In the afternoon several delegates met the city board of aldermen in regular session, and the resolutions adopted at the meeting above mentioned were presented. It was also urged upon the board to ask the Dominion government to appoint a central board of health, which would have almost unlimited powers and be possessed of ample funds to successfully inaugurate and carry out measures for the control of the epidemic. Mr. Gray, the chairman of the board of aldermen, stated, in behalf of that board, that they would petition the provincial government to appoint a provincial board of health, and he also assured the deputation that all trains leaving the city should be inspected before their departure.

The following extracts from a report made to the National Board of Health, immediately following our visit to Montreal, will give an idea of the situation at that time:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Sept. 7, 1885.

W. P. DUNWOODY, Esq., *Sec'y National Board of Health, Washington, D. C.:*

Sir:—I have the honor to submit to you the following facts concerning the small-pox epidemic in Montreal, that the fullest possible data may be in the possession of your board:—

Dr. G. P. Conn, president of this board, and myself, have just returned from Montreal, where we have been to attend a meeting of railroad medical officers and others to consider what measures can be brought into force that will better serve the interests of the traveling public and commerce, by preventing any further spread of this epidemic, which has already reached considerable proportions.

From information gathered from the health authorities of Montreal, from the interment record of the cemeteries, and the public press, it appears that the epidemic is still spreading. While this may not be the fact with the city proper, it should be remembered that the disease embraces municipalities adjacent to Montreal, and among which is St. Jean Baptiste, in which there are many cases, and no sanitary regulations are in force. These cases are not included in making up the official reports of the disease in Montreal, so the statements of the health department of Montreal do not represent the magnitude of the epidemic, which embraces the city and outlying municipalities.

Up to September 1, the health department of the city reported three hundred and eighteen deaths from small-pox. A little over eighty deaths occurred during the week ending September 1, according to the report of the health department, but in an examination of the records of the cemeteries one hundred and eighty-nine small-pox burials were found, while for the same period one hundred and seventy deaths from this disease were reported to the American consul. The latter records include cases from the districts outside of the limits of the city. It will be seen that if this represents the ratio between the number of cases in the city and those outside of it, the most accurate figures given by the authorities of

Montreal must be at least doubled to represent the actual magnitude of the epidemic.

The opinions of the English press, as well as the English-speaking people of Montreal, is that the epidemic is spreading.

The reason why it has not been restricted may be stated as follows :—

1. The bigoted opposition of a certain class of French Canadians to vaccination, and an abandon to the disease that borders upon fatalism. They believe that the disease is one of the inevitable results that must come to the uneventful and superstitious drudgery of their lives. They seem to be wholly indifferent, or else are opposed to any measures of prevention. In those districts outside of Montreal, which are under the control of the French, no efforts are made to prevent the spread of the disease. The municipality of St. Jean Baptiste, adjoining the city, is severely infected with the disease. Isolation is not enforced in this district, people visit infected houses, and public funerals are held in some instances. The people of this village go daily into Montreal to labor in the factories and elsewhere.

2. The health department of Montreal is unable to handle the epidemic, and this is due largely to the fact that the French last year obtained a majority in the city council and still hold it. This council, true to the traits and instincts of its constituency, refuse to give the health authorities sufficient funds with which to work, or enactments adequate to an effective health administration.

The evil results of the French supremacy in Montreal extend to all its departments. Even the recorder's court, before which cases were brought on complaint of tearing down the placards "small-pox," which the health officer had placed upon infected houses, while finding a verdict of guilty of a violation of the law, has in all such cases (and five have been tried) suspended judgment and allowed the defendant to go at large.

Up to last week the sanitary force of the city consisted of only three medical officers and nine sanitary police, which, were there no obstacles to their labors, was far too small to carry on the work in a manner even approximating efficiency.

More recent advices show that the suggestions made at the health conference have been carried out. Four medical inspectors have been appointed to attend the different railway stations and wharves, for the purpose of examining all persons leaving the city by rail or boat.

A provincial board of health has also been appointed.

On and after to-day (September 7), passengers and baggage coming or going to Montreal will be transferred to another train at points on the Vermont frontier.

While we were present at the meeting above mentioned, by invitation and not authoritatively, we took the opportunity to investigate as thoroughly as possible the exact state of affairs, and it is our opinion that the Canadian authorities cannot handle the epidemic within their own borders, much less serve us in any marked degree in keeping the disease out of the New England states.

As interstate and international commerce can only be regulated by the national government, we believe it to be the duty of the latter to take immediate action in the matter. Respectfully yours,

IRVING A. WATSON,
Secretary State Board of Health, New Hampshire.
G. P. CONN,
President State Board of Health, New Hampshire.

From the knowledge which we possessed up to this date, we believed it utterly impossible for the epidemic to be brought under control for many weeks at least, and that the liability of our own manufacturing centers becoming infected was daily growing greater. We therefore mailed a copy of the following order to every physician in the state :—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, N. H., Sept. 5, 1885.

Dear Doctor:—The epidemic of small-pox in Montreal and adjoining municipalities has reached such proportions as to render it probable that the disease may at any time be introduced into the states; we therefore ask you, and every other physician in the state, if a case is discovered, to comply with the following :—

1. Notify this board immediately by telegraph.
2. Notify the health authorities of your town or city, and see that the case is at once isolated.
3. Vaccinate immediately all that have been exposed, and take all other precautions that you may deem necessary in the case.

We would take this opportunity to suggest that you awaken among the people an interest in vaccination, especially in manufacturing towns where Canadian labor is employed, as only by thorough vaccination can any community be safe from the ravages of this loathsome disease. Should the disease appear in your practice, your are expected, in the interests of the public, to inaugurate measures for a general vaccination of the people of the vicinity. Physicians residing on the border towns will confer a favor by notifying this board, should small-pox appear in any town in Vermont or Canada adjacent to our state line, that we may take such measures to protect our own towns as may be thought best.

We desire not to produce any unnecessary alarm, but from the knowledge we have of the disease in Canada, we deem it prudent to be prepared for its outbreak in New Hampshire. Respectfully yours,

IRVING A. WATSON,
Secretary.

The following circular letter was mailed to the superintendents of all the railroads running through the state :—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF THE STATE BOARD OF HEALTH,

CONCORD, Sept. 5, 1885.

To Railway Managers and Superintendents :—

The epidemic of small-pox at Montreal and vicinity has assumed such magnitude, that we deem it our duty to call your attention to the necessity of thorough vaccination among your employés.

Train men are especially exposed to the contagion, and it is for the interest of the transportation companies, as well as the public, that this danger should be reduced to a minimum. We therefore recommend that the superintendents of the various railway lines issue a general order, requesting their employés to be vaccinated immediately, and that this be done without regard to prior vaccination, as absolute safety can only be secured through the protection of vaccination. No delay should be made in carrying out this suggestion, as the liability to contract the disease from infected goods and passengers is very great. Prompt action may be the means of not only preventing the disease, but of saving the transportation companies from a loss which always follows the appearance of this disease along their lines.

Should occasion require, this board will willingly furnish directions for the disinfection of infected cars or goods.

Respectfully yours,

IRVING A. WATSON, *Secretary*.
GRANVILLE P. CONN, *President*.

In order to secure the protection of the railroad employés, whom we regarded as subject to a liability of contracting the disease through infected goods or persons who had been exposed to the disease, or those convalescing, the board volunteered its services by offering to vaccinate at once the employés upon those lines most liable to transport the infection. The hearty co-operation of the different railroad managements was manifested by immediately issuing orders requiring their employés to be vaccinated. This work was very thoroughly and extensively carried out upon the various lines. The following letter, relative to the epidemic, was sent to the health authorities of all the cities and some of the larger towns of the state :—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Sept. 7, 1885.

To the Board of Health :

Gentlemen :—We take the liberty of calling your attention to the necessity of making a movement to protect the people of your locality from small-pox by vaccination. The work should be commenced at once. The extent to which small-pox prevails in Montreal and vicinity warrants every manufacturing town and city in the state inaugurating such a movement. The secretary of our board has just returned from Montreal, where he investigated as thoroughly as possible the extent of the epidemic and its management, and the facts revealed show that it is of large proportions, and owing to the traditions, superstitions, and indifference of the French Canadians, it is not under the control of the health department. A state of affairs exists which renders it probable that it will not be stamped out before cold weather, and if not it must inevitably spread to a large extent. The danger that it will be brought into this state is very great, especially that manufacturing towns will be infected.

From facts obtained from the American consul at Montreal, and these were obtained from the health department and the records of the cemeteries, it appears that there were last week, in and adjoining Montreal, one hundred and seventy deaths from this disease. There have been in the city proper, since the commencement of this epidemic up to the first of the month, three hundred and eleven deaths officially reported from this disease. It is very probable that the number has been much larger, since burial permits are granted in many instances upon the representation of friends and without the signature of the physician. The last figures given do not include the municipality of St. Jean Baptiste, where the disease is raging severely, or any of the outlying villages. At St. Jean Baptiste no sanitary regulations are enforced, and public funerals have been held of persons dying of small-pox.

While the health department of Montreal is endeavoring to do all it can to prevent the spread of the disease, it is inefficient to handle the epidemic as it should be dealt with, owing to several causes, the chief of which is that the French have this year a majority in the city council and refuse to make sufficient appropriations or adequate ordinances; likewise, the recorder's court is in the hands of the French, and all prosecutions for violation of the health ordinances have been *nil* by reason of a suspension of judgment in cases where the defendant was proven guilty.

These brief facts are given to show you that the danger of small-pox being introduced in this state is no imaginary one. We trust that your board will urge upon all manufacturers the necessity of having their employés vaccinated with the least possible delay, and that they *require* this to be done. So long as we can keep the people well vaccinated we have no fears of small-pox, and this work should be done *before* the disease reaches us. A letter similar to this will be sent to the health authorities of all our cities.

Very truly yours,
IRVING A. WATSON, *Secretary.*

At this time the question of public vaccination was receiving some attention, especially in the localities liable to become infected by reason of parties arriving from Montreal. Numerous letters were received asking for information and advice upon the subject, in reply to which the following circular was issued :—

THE STATE OF NEW HAMPSHIRE.

OFFICE STATE BOARD OF HEALTH,
CONCORD, Sept. 9, 1885.

To Town, City, and School Authorities :

As a general reply to numerous inquiries on the subject of the prevention of small-pox, we would say :—

1. That the board of selectmen, or other authorized health authority, of any place where Canadian labor is employed, as in manufacturing establishments, lumber business, etc., should take immediate measures to secure the vaccination of such class, as well as any others who have not availed themselves of the protection afforded by vaccination. Such action is provided for by the General Laws, chapter 112, to wit :—

"SECTION 1. Any town may appoint an agent for vaccination, who shall, at all times, be provided with suitable matter for communicating the kine-pox, and may vaccinate all persons at the expense of the town who have not had the small-pox or the kine-pox, and shall receive a suitable compensation therefor, to be paid by the selectmen. Such agent may be appointed by the town whenever, in their opinion, the health of the inhabitants of said town, by reason of the spreading of small-pox, shall require it."

2. School committees and boards of education, especially in that class of towns mentioned above, should require the vaccination of all pupils attending the public schools without delay.

The law on this subject reads as follows (chapter 81, section 2, General Laws) :—

"No child, unless he has been duly vaccinated or has had the small-pox, is entitled to attend any public school; and the prudential committees of the several districts, and those who exercise the powers of such committees, shall not allow any such child to be admitted to or connected with any such school."

3. The selectmen, or the health authorities, of towns particularly liable, from causes above stated, to the infection of the disease, should without delay select

a suitable house in which to isolate and care for any persons that might be attacked with the disease. If such arrangements are made before the disease appears, it will tend to secure promptly the isolation necessary for the safety of the people should there be an outbreak. The authorities should, as far as possible, discourage for the present all travel between their respective localities and Canada. Gratuitous vaccination of the poorer classes, pupils included, should be provided for, if not for the entire population.

Respectfully yours,

IRVING A. WATSON, *Secretary.*

SMALL-POX FEARS AT BERLIN AND GORHAM.

The following letter from A. S. Twitchell, of Gorham, was addressed to the governor of the state:—

GORHAM, N. H., Sept. 12, 1885.

My Dear Governor:—Our people here and at Berlin, especially on account of our large French population, are greatly exercised over the small-pox now raging in Canada, and situated as we are, with trains almost hourly going back and forth, to and from the infected district, there is exceeding cause for alarm, and especially is there cause for immediate action, because of a French excursion which left a few days ago, taking a large number from both our towns, and their return from there is sure, unless at once guarded against, to bring the scourge upon us, for they care nothing for it and are wholly lawless as to its distribution. I am informed and understand that no quarantine can be ordered except upon the request of the governor of a state thus threatened, and I am sure that if ever there was a time when this was required that time is now, for if it once gets started in our midst, the cost must be fearful, and the rushing in upon us of the French Canadians places us in the most immediate danger. I have written Dr. Watson also, secretary of the board of health.

Faithfully yours,

A. S. TWITCHELL.

Upon the receipt of the above letter, the governor transmitted the same to the state board of health, with the following letter:—

THE STATE OF NEW HAMPSHIRE.

EXECUTIVE DEPARTMENT.

MANCHESTER, N. H., Sept. 15, 1885.

My Dear Sir:—I inclose a letter received from A. S. Twitchell, Esq., of Gorham, for your consideration. I shall be glad to co-operate in any measures it may be proper to take.

Yours truly,

MOODY CURRIER.

IRVING A. WATSON, ESQ.

The following is the reply which was transmitted to Mr. Twitchell in response to his letter of Sept. 12 to the governor:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Sept. 17, 1885.

A. S. TWITCHELL, ESQ., *Gorham, N. H.:*

Dear Sir:—Your letter is at hand, and your letter to Governor Currier has been referred to me for consideration.

I fully appreciate the situation, both at your place and at Berlin, so far as danger of small-pox infection is concerned, but it is not a simple matter to guard against by quarantine. We cannot exercise any authority outside the limits of our state, consequently we cannot prevent the return of the class you mention, or the coming into the state of any persons that might desire to do so. A quarantine against the towns you name would mean the stopping at some point north of Berlin of all persons who intended to stop at that place or Gorham, and detaining them under certain restrictions for a certain number of days. This method of arresting or attempting to arrest such a disease as small-pox is no longer relied upon, except, perhaps, under certain conditions very different from those at present affecting any place in our state. The expense of such a procedure would be very great, and the result probably unsatisfactory. Inspectors have been placed upon the Grand Trunk trains coming from Montreal, but the most rigid system of inspection will detect only those cases which are made apparent by the progress of the disease, so that very little protection is afforded by this method. With the shipping of goods we, as a state, have nothing to do, as interstate and international commerce is regulated by the national government. Your safety rests with the vigilance of your town authorities, to a very great extent.

1. In vacination. Your town should immediately provide for free public vaccination, as it may do under sect. 1, chapter 112 of the General Laws. This should be thoroughly carried out among all classes, by the public vaccinator going from house to house. School children should be vaccinated as required by law. The opposition to vaccination that will probably be met with among some of the French Canadians can be overcome by securing the co-operation of the priest in the work.

2. By the early discovery of any case that might appear, and immediately isolating the same, with the isolation and vaccination of any and all persons who may have been exposed.

By carrying out the above suggestions you can feel assured that the disease cannot prevail to any alarming extent, even if a case or two should be brought into your town. All physicians in this state have been ordered to report to this office *immediately* by telegraph every case discovered, and this board will see that a proper management of the same is provided for without delay.

I feel that I cannot insist too strongly upon the importance of a general and thorough vaccination in Gorham and Berlin, and if not already begun, I trust it will be commenced at once.

There are many towns in the state in as much danger as those mentioned above, and we are consequently at work, and have been for three weeks, to secure the best possible protection for them all. We feel that the work is in most of them so well done that small-pox cannot prevail to any great extent in this state, even if several cases should be brought to us, which, it is not unreasonable to expect, may be before next spring.

I should esteem it a favor if you would lay the substance of this letter before the authorities of Berlin, as well as your own town. Both towns ought to have an efficient board of health, if they have not already appointed such. If I could assist in this work by going to your place, I would be glad to do so next week. I am engaged for every day of this week, but might visit you next week Tuesday if it were important for me to do so.

Very truly yours,

IRVING A. WATSON, *Secretary.*

Immediately after the receipt of the above letter the following were received from Mr. Twitchell:—

GORHAM, N. H., Sept. 19, 1885.

My Dear Doctor:—I received your letter and at once laid the matter before the authorities, and they have begun moving as suggested. I did not intend to advise or ask any special quarantine for our towns. What I meant was, that unless they made some effort in Montreal to stay the disease, care should be taken to keep it from *crossing the line.* I see they are beginning to look after it in that direction. We shall do all we can, and I hope it will not get started; but there is really much cause for alarm, situated as we are. I thank you for the letter, a portion of which the *Mountaineer* published.

In great haste,

A. S. TWITCHELL.

GORHAM, N. H., Sept. 22, 1885.

My Dear Doctor:—None of the mails yet, coming from Canada over the Grand Trunk road, have ever yet given any appearance of fumigation, and all the postmasters, and especially the postal clerks, complain of it and are in fear. It is, you know, one of the most important trunk lines into the states, with heavy mails. I have reported it to the postmaster-general. I am also informed that as yet nothing has been done on this line to guard against its transmission to the states, and as the disease is rapidly spreading, nothing that can possibly be done to keep it back should be neglected.

In great haste, but faithfully, etc.,

A. S. TWITCHELL.

LETTER TO THE STATE DEPARTMENT.

THE STATE OF NEW HAMPSHIRE.
OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Sept. 24, 1885.

HON. THOMAS F. BAYARD, *Secretary of State, Washington, D. C.:*

Sir:—We desire to call the attention of the government to the fact that more stringent measures than can be carried out by individual states should be at once inaugurated to prevent the introduction of small-pox into the New England states.

This board represented the facts of the Montreal epidemic to the National Board of Health more than two weeks ago, and stated the necessity of government interference in the matter.

The most reliable information that can be obtained shows that the epidemic at Montreal is not under control, but is still spreading; and it would seem improbable that, in view of the approach of cold weather, it will be possible for the existing health authorities of the province of Quebec to get the disease under subjection at present. We therefore ask that medical inspectors be appointed at such points as may be deemed necessary in Maine, New Hampshire, and Vermont, with ample powers to regulate the transportation of passengers and freight coming from the infected district in Canada.

Very truly yours,
IRVING A. WATSON, *Secretary.*

At the date of the above letter, no information whatever had been received by the State Board of Health of New Hampshire that the government would interfere in restricting the importation of small-pox into the states. It seems, however, that on September 15, the governor of Massachusetts addressed a note to Secretary Manning, asking government interference in restricting the importation of small-pox into the states. September 21, Governor Pingree, of Vermont, made formal application to President Cleveland for the appointment of medical inspectors to assist the local health officers of that state in preventing or suppressing the spread of small-pox throughout the state and in restricting the importation of the disease from Canada. On September 22, Governor Robie, of Maine, indorsed and approved a letter from the state board of health of Maine to the national board of health, asking that the northern frontier of that state be included in the territory which it understands the general government would take measures to protect against small-pox.

THE MARINE HOSPITAL SERVICE HEARD FROM THROUGH THE PRESS.

We had heard through the daily papers that the government had determined to place inspectors at such points as was deemed necessary, to inspect all persons and baggage coming from Montreal and other infected localities, to prevent the introduction of small-pox into the states. We had learned through the same channel that the inspectors had been appointed and assigned to duty about the 25th of September. Inspections made by this board from that date to October 1, convinced us that no efficient work was being done or was likely to be done for some time to come, and the large amount of travel that was occurring daily by reason of laborers coming from Montreal to the different manufacturing towns of New England, as well as to the lumber camps of New Hampshire and elsewhere, convinced us that more active measures were immediately demanded. By the advice and consent of Governor Currier, it was decided to establish a system of inspection upon the railroads in this state, for the purpose of protecting the manufacturing centers of the state, more particularly the cities of Manchester and Nashua, to which a considerable number of Canadian laborers were daily coming. The inspection was to be carried out mainly upon the Concord Railroad, as passengers from Canada coming over the different lines leaving Montreal, would eventually pass over the Concord Railroad on their way to manufacturing towns and cities in New Hampshire and other parts of New England. One inspector, in addition to the work performed by the secretary, and the occasional assistance of the president of the board, was all that was required. Dr. George Cook, of Concord, was commissioned as follows:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Oct. 1, 1885.

GEORGE COOK, M. D., *Concord, N. H.:*

Sir:—You are hereby appointed Medical Inspector for the State Board of Health, with full authority to inspect passengers and baggage coming from Canada, with reference to the restriction of small-pox. You will act upon orders given you from this board from time to time until this commission is revoked.

Per order.

IRVING A. WATSON, *Secretary.*

The following rules were issued for the guidance of the sanitary inspectors:—

STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH.

RULES FOR SANITARY INSPECTORS.

1. All persons coming from Canada, and destined to any point in New Hampshire, must be examined with reference to vaccination, and all such found unprotected, if from a locality infected with small-pox must be vaccinated by the inspector or detained for quarantine at such place as the inspector may designate.

2. The inspector must issue to all persons coming from Canada, whether destined to points in New Hampshire or elsewhere, the railway inspection ticket, issued by this board, so punched as to indicate to the health officer at destination of trip, as per arranged understanding of punch marks, all the knowledge obtained of said person as to whether such person came from an infected locality or not, when vaccinated, whether with checked baggage, etc.

3. For the information of local health authorities, the inspection ticket may be issued to persons coming from localities in the state, when, in the judgment of the inspector, such persons would be liable to suspicion by the local health authorities at the point of destination.

4. The inspector will notify by telegram all towns and cities requesting it, when any suspicious persons are found destined for such towns and cities.

5. The inspector will keep a record of all persons coming from Canada and destined to points in New Hampshire, with the place of destination, date, and other facts required by the inspector's record check, and of the number of inspection tickets daily issued to such persons going to other states, with the name of the state.

6. Inspectors will render a weekly report to this board of the number of trains inspected, and return with such report the inspectors' record checks for the same week.

Per order.

IRVING A. WATSON, *Secretary.*
G. P. CONN, *President.*

By this date the general alarm had become so great throughout New England, especially where Canadian help was employed, that such cities and towns were upon the alert for the discovery of any source of infection that might be brought them. In order to render the inspection service which we had established as thorough as possible for our own state, and at the same time to extend the benefits of the work as far as possible to other localities, a system of ticketing the inspected person was adopted. The following ticket was issued :—

<table>
<tr><td>Month.</td><td colspan="2">RAILWAY INSPECTION SERVICE, STATE BOARD OF HEALTH,
NEW HAMPSHIRE.</td></tr>
<tr><td>OCT.
NOV.
DEC.
JAN.
FEB.
MAR.</td><td>To be retained by the person to whom given, unless taken up by a health officer at destination of trip. This ticket will save the bearer the trouble of unnecessary inspections.
Ce billet doit être retenu par la personne qu'il est donné, à moins qu'un officier de santé vous le prenne à destination du voyage. Ce billet exemptera au porteur déplaisir d'une inspection non nécessaire.
....*Inspector.*
IRVING A. WATSON, *Secretary.*</td><td>F
E
D
C
B
A</td></tr>
<tr><td>Day.</td><td colspan="2">1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31</td></tr>
</table>

The key to the same, as given on opposite page, was furnished to the inspectors, local health officers, and to the health officers of all the cities and towns in New England having a population of over five thousand. The inspector, in making his regular train inspection, ascertained from what place the passenger came, and if from Montreal, as will be seen by the key, the letter A was punched out of the ticket; if he had checked baggage, the letter F was also punched; if recently vaccinated, the letter D was punched out. The ticket was then signed by the inspector and given to the person inspected, who, not knowing the significance of the punched letters, regarded the same as a clean bill of health. The health officers on the lookout for such persons demanded the inspection ticket at their point of destination, and one punched as indicated above would inform the health officer that the person holding the same had come from Montreal with checked baggage, and had recently been vaccinated. In Manchester and Nashua such persons with their baggage were immediately taken to the fumigation rooms and thoroughly fumigated. The result of this work in the two cities mentioned will be shown further on. A complete record was kept by the inspectors of the number of persons daily inspected, where they came from, their condition as indicated by the inspection ticket, and their destination. These figures will be shown in the report of the inspector.

RAILWAY INSPECTION SERVICE.

STATE BOARD OF HEALTH, NEW HAMPSHIRE.

KEY TO LETTERS ON INSPECTION TICKET.

A. From Montreal or other infected locality.
B. Cannot learn from what locality the person came.
C. Came from an uninfected locality.
D. Recently vaccinated.
E. Has vaccination scar on arm.
F. Has checked baggage.

Read only the letters that have been punched.

IRVING A. WATSON,
Secretary.

The thoroughness with which this inspection was carried out from the start revealed at once the inefficiency of the government inspection service. With a view to ascertaining to what extent inspections were being made by the Marine Hospital Service, and to assist in perfecting the same, the following letter was addressed to Surgeon Austin, who we had incidentally learned had been detailed to take charge of the inspection service, with headquarters at Burlington, Vt.

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Oct. 3, 1885.

DR. H. W. AUSTIN, *U. S. Marine Hospital Service, Burlington, Vt.:*

Dear Sir:—Assuming from what we have seen in the public press that you are surgeon in charge of the railway medical inspectors that have been recently put on duty along the frontier between the United States and Canada, with a view to restricting the spread of small-pox from Montreal and vicinity to the states, we ask for some information regarding the work of such inspectors and the instructions given them by the department under which they were appointed.

A large amount of Canadian travel, including passengers over the Central Vermont, Passumpsic and Southeastern, and the Grand Trunk Railway, going to the manufacturing centers of this state, Maine, Massachusetts, and Rhode Island, pass over our New Hampshire lines. To further secure our own towns and cities against the infection of small-pox, and especially the manufacturing city of Manchester, we have placed inspectors on such trains running through our state as we deemed necessary.

Our inspections thus far reveal some defects in the work of your inspectors, to which we desire to call the attention of your department.

1. We have found no evidence of revaccination by your inspectors, if the individual had ever been vaccinated, notwithstanding the vaccination may have been performed many years ago. If this is the rule which your inspectors follow, it is certainly open to criticism.

2. It would very much assist the work of local health authorities if your inspectors would give to each person examined an inspector's ticket or certificate which should set forth facts that should give local health authorities some knowledge of the case, or at least the fact that a government inspector had seen the individual in question.

We would respectfully ask that some ticket system be at once adopted that would give our inspectors and the health authorities of the towns where the individual is destined, some knowledge that may be of service in determining what action is necessary by the local authorities.

It would seem that some co-operation between the Marine Hospital Service and the health departments of the states would give your service greater strength and efficiency. As a board we regret the fact, so far as this state is concerned, that a government service to which is delegated the duty of, and the necessary funds for the restriction of epidemic diseases, should undertake such a work independent of the assistance of the state health departments, which would be freely given, or that your department should neglect to furnish the state with full information as to its work, when such interests are at stake as in the present instance. Such a course leaves the state authorities in so much doubt that their confidence in the government service is much impaired, hence the appointment of inspectors in this state. Moreover, the results of the inspections made by this board the last few days convince us that our premises are well taken.

Any information which your department can give this board will be received with pleasure, and we will also gladly co-operate, so far as possible, with you in the work which is now so essential to the welfare of the states.

Very truly yours,

IRVING A. WATSON, *Secretary.*

Prior to the writing of the above, the president of the board had addressed a letter to Dr. W. R. Prime, of Richford, Vt., who, we had learned, had been appointed one of the inspectors, asking him for some facts in relation to the work. The following reply was received:—

RICHFORD, VT., Sept. 29, 1885.

DR. G. P. CONN:

Dear Sir:—In reply to yours received this morning, would say that on Friday last H. W. Austin, Surgeon U. S. M. H. S., who is sent out to appoint officers to inspect passengers entering the United States by railway, appointed me to inspect all passengers coming via the Southeastern Railroad.

Although I have not yet received my instructions, I understood from him that all persons who have no proof of having had small-pox or recent vaccination, would be vaccinated by me on the train before entering the United States. If any refuse they are to be put off the train at the line, and if they come to this side be arrested.

I am now awaiting further instructions, also vaccine virus which Surgeon Austin said would soon be sent me. Will gladly give you further information as soon as I receive it.

Very truly yours,

W. R. PRIME.

The anomalous position of a commissioned government inspector waiting for instructions in regard to work which it was imperative should be done at once, and also for vaccine virus, did not inspire us with confidence that the work undertaken by the government would be likely for some time to assume a reliable shape.

The following letter contained the first official information received by the State Board of Health of New Hampshire, in relation to the inspection service established by the government:—

CUSTOM HOUSE, BURLINGTON, VT.,

COLLECTOR'S OFFICE, Oct. 3, 1885.

DR. CONN, *President State Board of Health, Concord, N. H.*:

Dear Doctor:—Inclosed, find regulations adopted for the guidance of sanitary inspectors. We are using every means practicable to prevent the introduction of small-pox. If inspectors are appointed by the New Hampshire Board of Health, we will be pleased to co-operate with them. We have inspectors appointed on all the in-coming trains, who are instructed to be vigilant, and from personal observation I believe the rules are strictly carried out.

Very truly yours,

H. W. AUSTIN,

Surgeon M. H. S.

The following is a copy of a newspaper clipping, which Surgeon Austin refers to as "the regulations adopted for the guidance of sanitary inspectors":—

REGULATIONS FOR SANITARY INSPECTORS.

The following instructions will be observed by the sanitary inspector on the following mentioned railroads crossing the United States boundary line, viz.: The Grand Trunk Railway at Rouse's Point, N. Y., and Island Pond, Vt.; the Passumpsic Railroad at Newport, Vt.; the Central Vermont Railroad at Highgate Springs or St. Albans; the Canada Atlantic at Rouse's Point, N. Y., and the Southeastern Railway at Richford, Vt.

All persons bound for the United States, coming from Montreal or other places in Canada where small-pox prevails, must produce satisfactory evidence to the inspector that they are protected by a recent vaccination, or submit to this operation before they are allowed to cross the boundary line.

Inspectors will vaccinate all unprotected persons free of charge.

Persons coming from Montreal or suburban villages will be carefullv questioned as to their residence, whether small-pox has occurred in their families, or whether they have been in contact with the disease. Inquiries should also be made relative to their baggage, whether it consists of bedding, household goods, etc., likely to be infected, and if any person or article of baggage is considered by the inspector infected, or likely to introduce the disease into this country, they or it should not be permitted to cross the line into the United States.

You may consider persons protected who may show evidence of having had the small-pox or varioloid, or who exhibit a well-defined mark of vaccination. You may accept, as evidence of protection, a certificate from any physician in good standing that the person presenting the same has been successfully vaccinated. Should you doubt the validity or authenticity of the certificate, you may refuse any such person presenting the same the privilege of crossing the border, unless he will submit to vaccination. Baggage known to have come from any infected district and believed to be infected will be thoroughly fumigated with burning sulphur at the following points, viz.: Rouse's Point, St. Albans, Richford, Newport, and Island Pond.

Weekly reports should be made to Surgeon H. W. Austin, United States Marine Hospital Service, Burlington, Vt., of the number of trains inspected, number of persons examined, number of persons vaccinated, number of pieces of baggage fumigated, and any other information relative to services performed by the inspector.

H. W. AUSTIN,
Surgeon U. S. Marine Hospital Service.
B. B. SMALLEY,
Collector of Customs, District of Vermont.

A letter was received from Surgeon Austin, dated October 4, in reply to one addressed to him by the secretary on October 3, in which he says:—

"I exceedingly regret that I have been unable, so far, to make any reports to the state boards of health, but you will readily understand the difficulties which

I have encountered in organizing a service of this nature, arranging the details of the same, securing physicians who are qualified and who are willing to do the work, procuring rooms, etc., for the disinfection of baggage, preparing instructions for inspectors, etc., etc., which has thas far occupied every minute of my time."

He further says:—

"I trust I am not acting alone in this matter, and ask for the support and co-operation of the State Board of Health of New Hampshire. *It is our instruction from the department to co-operate with state and local authorities, and make such report as would be useful to them.*" . . . "I am as anxious as any one to adopt every possible measure that can be carried out that will prevent the introduction of small-pox into this country, and *any suggestions which the state board of health will make will be gladly received.*" "In regard to certificates, which you request should be given each passenger by our inspector, I will state that if you will furnish me with a form such as you desire, that can be printed so that it will not consume the time of the inspector, I will see that every passenger coming from Canada into the United States shall be furnished with one. The printing of them will take a little time and it could not commence at once. Our inspectors will be instructed to give you any information that might be useful to you. I should be pleased to meet you, or any member of your state board of health, and advise with you as to the measures adopted, or to be adopted, to prevent the spread of small-pox to this country from Canada."

The general tenor of the letter seemed to indicate a cordial and earnest desire on the part of Surgeon Austin to co-operate, so far as he was able, with the health authorities of the states, and also to perfect his own service as rapidly as possible; but the tardiness with which this was accomplished showed that we had acted none too soon in establishing a state inspection service.

The following letter from the president of the board is self-explanatory:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Oct. 5, 1885.

DR. H. W. AUSTIN, *Surgeon U. S. M. H. S.:*

Dear Doctor:—I have the honor to acknowledge the receipt of your letter of the 3d inst., together with a copy of your instructions to inspectors on railway trains, which I shall refer to our full board, which meets in this city to-morrow.

I inclose a blank certificate and key to the same, which certificate our inspector issues to all coming from Canada, and the key has been sent to all the principal towns and cities in New England.

We found it necessary to place an inspector on the trains, in order to avoid a panic in towns and cities where the Canadian element is largely represented, and in order to allay public excitement, it was necessary that the Canadian passenger should have something to show that his entrance into the states had been so guarded as to reduce to the *minimum* the possibilities of contagion. As your inspectors did not give the passenger anything by which he could prove that he had been properly inspected, your work was *nil*, so far as the public was concerned, and they demanded some measures be taken that were tangible.

Now when a Canadian arrives in Manchester or Nashua, his card shows the health officer what has been done, and if further care should be exercised they are informed of the fact.

It would be a pleasure to co-operate with your service, and I have no doubt but a conference of representatives of all the state boards of health of New England with the Marine Hospital Service might be of material advantage in the protection of the health of the people, and of interstate and national commercial interest.

Very respectfully yours,

G. P. CONN.

Recognizing the fact that the state inspection service would probably be continued for a considerable period of time, the health authorities of the manufacturing towns in the state were notified of the work as follows:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Oct. 5, 1885.

Board of Health:

Gentlemen:—We are inspecting, as far as possible, persons who come from Canada into our state, with a view to restricting small-pox. To aid local health boards, by giving them sufficient knowledge of the person to determine their course of action, or to satisfy them in the case, we shall issue to such persons inspected by our authority a ticket like the inclosed. The key is to be given only to health officers and persons authorized by them (as, for instance, a policeman) to examine such ticket upon the arrival of the suspected person.

Thus, the inclosed ticket, as punched, would indicate that the person came from an infected district with baggage, and should at least be kept under the eye of the authorities for a time, or better still, the clothing and baggage should be fumigated with sulphur. You should also see that such person is vaccinated. We have adopted this system to assist local boards of health in restricting small-pox, by giving to such boards all the information which our inspectors are able to obtain of the suspected person. The person receiving the ticket, not knowing what the punch mark means, thinks it a "clean bill of health," hence retains it for his "passport" when he is asked for his inspection certificate.

Owing to the continuance of small-pox in Montreal, and the appearance of the disease in several other localities in Canada, it becomes the duty of local boards of health, especially in manufacturing towns, to examine all persons coming from infected districts, and at least to see that they have been recently vaccinated, if they do not have certificates to that effect.

Very truly yours,

IRVING A. WATSON,
Secretary.

Boards of health and health officers of other states, as stated above, were notified of the work being done by the State Board of Health as follows:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Aug. 12, 1885.

Board of Health:

Gentlemen:—As many persons coming from Canada over the Central Vermont, Passumpsic, and Southeastern, and Grand Trunk railways pass through our state, we have put on medical inspectors for the protection of our larger towns and cities against the infection of small-pox. Several car loads pass daily through our state to points in Maine, Massachusetts, Rhode Island, and Connecticut. While it is not possible for this state to thoroughly look after persons going into other states, we propose, as far as possible, to assist other health authorities in this work. To this end we will issue an inspector's ticket to all Canadians going over our lines into your city, if desired by you. Said ticket will be punched by our inspector so as to give you all the information obtained of the person as per ticket and key inclosed.

This, the inclosed ticket,* would indicate that the person came from an infected district and had baggage. Upon this information your department would at once act knowingly.

In addition, if you would pay the cost of a message, we would notify you by telegraph when we found a suspicious case destined for your city. Please notify us at once if you desire inspection tickets issued as above stated.

Very truly yours,

IRVING A. WATSON,
Secretary.

In response to the above, many towns and cities throughout New England returned their cordial thanks to the board for the work it was doing to protect their respective localities. Many of them at once volunteered to refund all the expense imposed upon the board in notifying such town or city of any suspicious cases. Even the city of Worcester, Mass., sent the clerk of its board of health, Mr. James C. Coffey, to interview the state board of health, and to see if arrangements could not be made with the latter to fumigate at Nashua the passengers and baggage from infected localities going to Worcester, for a reasonable compensation. While the board was willing to do all in its power to restrict the disease it could not undertake the responsibility or devote the time necessary to the work of fumigating persons and baggage destined to localities outside the state.

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* The ticket inclosed had A and F punched.

The degree to which the inspection service of the board was recognized may be shown by one letter taken from the many received by the board on the subject:—

CONNECTICUT STATE BOARD OF HEALTH,
SECRETARY'S OFFICE, NEW HAVEN, Oct. 14, 1885.

IRVING A. WATSON, M. D., *Secretary State Board of Health of New Hampshire:*

Dear Sir:—At a meeting of the Connecticut State Board of Health held yesterday in the state capitol at Hartford, your communication of the 7th inst., relating to the action of your board for the purpose of restricting the introduction of small-pox into your state, was read. Your methods of inspection were much commended, and the secretary was directed to express the thanks of the Connecticut State Board of Health to the State Board of Health of New Hampshire for their timely, judicious, and energetic action in keeping the pestilence without their borders, and in standing as a barrier between it and the citizens of Connecticut. I have the honor to be,

Very respectfully yours, etc.,
C. A. LINDSLEY, M. D.,
Secretary Connecticut State Board of Health.

It would seem that an account of the efforts of the board, as well as the secretary's letter of October 3, to the surgeon in charge at Burlington, had been transmitted to the supervising surgeon-general of the Marine Hospital Service, as will be seen in the following communication from that official. This letter is remarkable from the fact that it does not touch upon a single point relative to any letter or action of the state board of health except the one point of censuring the evident inefficient action of the supervising surgeon-general in not giving at the time a better system of inspection. It shows that this official either intentionally or unintentionally misconstrued the substance of the letter of October 3, and with an autocratic impudence asks to be pardoned for not having extended a thing that had never been asked for. It would have been far more consistent with the duties of, as well as the courteous attention due from the head of a department, if, instead of directly offering little less than an insult to the honest endeavors of the board to assist in perfecting the service which was established under his supervision, he had personally given his attention to a matter which at that time was of the utmost importance to a large section of the New England, Middle, and Western states.

TREASURY DEPARTMENT,
OFFICE SUPERVISING SURGEON-GENERAL,
U. S. MARINE HOSPITAL SERVICE,
WASHINGTON, Oct. 6, 1885.

DR. IRVING A. WATSON, *Secretary State Board of Health, Concord, N. H.:*

Dear Sir:—I have received from Surgeon Austin your letter of October 3, in which you censure the department for not having furnished aid and information, etc., in the matter of the small-pox epidemic. As your letter is the first intimation that this office has ever received that you desired aid or co-operation in any way, I trust I may be pardoned for not having extended it heretofore.

I inclose a circular (No. 91, 1882), giving the manner in which the states are aided from the epidemic fund.

In conclusion allow me to invite your attention to the fact that it has not heretofore been customary to extend federal aid to any state previous to an application therefrom.

Your request for tickets will be attended to at once, and you will see by circular 145, 1885, that your own inspectors may call upon the customs inspectors at any time for such aid as they may be able to furnish.

Very respectfully,
JOHN B. HAMILTON,
Supervising Surgeon-General M. H. S.

The circulars alluded to in the above communication are as follows:—

[CIRCULAR.]

THREATENED OR ACTUAL EPIDEMICS.

TREASURY DEPARTMENT, OFFICE SUPERVISING SURG'N-GEN'L,

1882.
DEPARTMENT NO. 91. U. S. MARINE HOSPITAL SERVICE,
MARINE HOSPITAL SERVICE. WASHINGTON, D. C., Aug. 9, 1882.

To Medical Officers of the Marine Hospital Service and Officers of State and Municipal Boards of Health :

I am directed by the secretary of the treasury to inform you that Congress, at its last session, enacted that

"The president of the United States is hereby authorized, in case of a threatened or actual epidemic, to use a sum not exceeding one hundred thousand dollars, out of any money in the treasury not otherwise appropriated, in aid of state and local boards, or otherwise in his discretion, in preventing and suppressing the spread of the same."

He further directs me to inform you that the president has decided to employ this contingent appropriation through the agency of the treasury department, and that, in case of a threatened or actual epidemic, immediate action will be taken upon application to the governor of a state, addressed to the secretary of the treasury.

JOHN B. HAMILTON,
Supervising Surgeon-General U. S. Marine Hospital Service

[CIRCULAR.]

PREVENTION OF SMALL-POX.

TREASURY DEPARTMENT, OFFICE OF THE SECRETARY,

1885.
DEPARTMENT NO. 145. WASHINGTON, D. C., Sept. 28, 1885.

To Customs Officers :

Inspectors and other officers of the customs on the Canadian frontier will aid the sanitary inspectors of the Marine Hospital Service, and similar inspectors acting under state authority, as far as practicable without interference with their regular duties, and will furnish them such facilities for examination of baggage as may be practicable.

Customs officers in the northern frontier districts will acknowledge the receipt of this order through the proper channels.

DANIEL MANNING,
Secretary.

The faulty methods or the tardiness of the department was so marked that the government inspectors themselves recognized the defects, and undertook to bring about a better order of things. This may be seen in a letter from Dr. H. P. Hall, sanitary inspector at St. Albans, to Dr. G. P. Conn, president of the board :—

ST. ALBANS, Oct. 7, 1885.

G. P. CONN, M. D. :

My Dear Sir:—Dr. Fassett handed me your letter to him of 6th inst., containing a form of certificate used by your state board of health. I like it very much and at once had some printed, with slight alteration, and to-night, October 8, shall commence their distribution.

I wrote your secretary a few days since, giving him my experience in this new business thus far. We are now in a condition to do effective work. Certificates of inspection should have been insured to inspected persons at once, and thus saved annoyance beyond this point south. I ordered the printing of certificates at my own expense, trusting to the probability of the U. S. M. H. S. ultimately paying the bill.

Our new "smudge house" is in daily action. All suspicious baggage of merchandise meets with a warm reception in this house; all this is done at the expense of the railroad company here, handling baggage, I mean, in its transportation to and from the "smudge house." The U. S. M. H. S. furnish the disinfectants. The sanitary inspector looks over the baggage, etc., on the cars before reaching St. Albans, assisted by the United States customs inspectors, and what we mark for smudge house is sure to receive attention as soon as it reaches St. Albans. We hope to learn that our efforts will reap good results.

Very respectfully,

H. P. HALL,
Sanitary Inspector, St. Albans, Vt.

A day later the following letter was received from Dr. W. R. Prime, sanitary inspector at Richford, Vt., touching upon the subject of inspection tickets :—

RICHFORD, VT., Oct. 8, 1885.

DR. G. P. CONN:

Dear Sir:—As our regulations were published in the papers I did not think it necessary to write you then as I agreed to in my letter to you last week. I understand you are inspecting passengers at Concord, and I have a suggestion to offer which may be of some service to you in preventing delay and unnecessary trouble to passengers and inspectors at Concord. It seems to me that certificates furnished the passengers at the line would be a great help, and although I have no instructions to issue them, I would gladly attach my signature and the customs seal, and give them to all I inspect, if you could supply me with them. I send you a description of what I would consider a convenient ticket, and of about the right size to be stamped with the customs seal across the face of it. In the place for remarks we could use the cipher which you use on your certificates in New Hampshire. If I can be of any further service to you in this work, please call on me.

Very truly yours,
W. R. PRIME, M. D.

G. P. CONN, M. D.

The idea of a government inspector printing his own tickets at his own expense, and another asking a state organization to furnish a suitable inspection ticket is, in itself, a severe commentary upon the management of the Marine Hospital Service. It is an exhibition, however, of the determined efforts of those efficient officers to secure a reliable service, but at the same time it shows how little confidence they place in the department in which they were serving.

On October 8, the secretary of the board, with Dr. Young, secretary of the State Board of Health of Maine, visited Island Pond and had an interview with the customs officers and United States sanitary inspector at that point. No means had then been provided for the fumigation of baggage. The customs officers recognized the imperative necessity of it, and secured the advice of the representatives of the two boards of health mentioned as to the construction of such a room upon the broad platform near the baggage-room of the customs officer. Dr. Pottle, the inspector, said the first document he received was his appointment as inspector, and the next received were blanks on which to make reports; he then waited for instructions, but received none. He telegraphed, after two days, to Surgeon Austin to know what to do. He also had to wait some time for vaccine virus. The instructions to inspectors were explicit in ordering fumigation of baggage; but none of the inspectors received any instructions as to how the work should be done, nor were they provided with any means for doing the same,—certainly an inexcusable neglect on the part of the government.

Official "regulations for the maintenance of quarantine inspections on the northern frontier of the United States" were not officially promulgated by the supervising surgeon-general of the Marine Hospital Service until October 10.

Recognizing the immediate and urgent importance of securing a better inspection service, the secretary succeeded in making an appointment by telegram to meet Surgeon Austin at White River Junction on October 13, for the purpose of discussing the situation and perfecting plans and measures that would remedy the existing defects in the work of the department. The secretary represented to Surgeon Austin: First, that there was an imperative necessity that the government inspectors should issue inspection tickets to all persons examined by them; second, that revaccination should be performed in all cases where there was not positive evidence that recent vaccination had been successfully performed; third, that the inspectors should not accept a physician's certificate that the person had been vaccinated and that he came from a locality free from small-pox, unless said physician was known by the inspector to be a reputable practitioner of medicine; fourth, that thus far the fumigation of baggage amounted to nothing, and that some provision should be made immediately to do this work effectually. Surgeon Austin admitted that the charges were true, and promised that the department would at once issue inspection tickets as requested, and revaccinate all persons who did not show evidence of recent vaccination. He also admitted that nothing had yet been done that amounted to anything in the work of fumigating baggage, and asked how far the people would sustain the service in carrying out fumigation. It was evident from this interview that Surgeon Austin was endeavoring to do everything within his power to give the country an efficient inspection service, but that his efforts were in a great degree handicapped from the fact that he did not or could not act without submitting every proposed measure to the scrutiny of the supervising surgeon-general, who, having never visited the locality, could not have been sufficiently conversant with the requirements to give orders in detail as promptly as the situation required. The surgeon-general should have either familiarized himself with the details of the situation, or given Surgeon Austin discretionary powers of action.

No reflections whatever are to be cast upon Surgeon Austin on account of the deficiencies which at that time were apparent in his service, and the same may be said of the inspectors who were performing the work upon the trains under the great disadvantage of not being explicitly informed regarding their duties, or provided with ample facilities for carrying on the work imposed upon them. From this interview a promise was given that the points which had been considered and agreed upon should be presented to the supervising surgeon-general at once, with a request for immediate action in the matter.

On the 16th day of October a letter was received from the assistant secretary of the department of state, informing the board that its letter of September 24, to the honorable secretary of state, calling his attention to the necessity of government interference in restricting the introduction of small-pox into the New England states, had been referred to the treasury department. A letter bearing date of October 24, from the supervising surgeon-general, is as follows:—

TREASURY DEPARTMENT,
OFFICE SUPERVISING SURGEON-GENERAL,
U. S. MARINE HOSPITAL SERVICE,
WASHINGTON, Oct. 24, 1885.

IRVING A. WATSON, M. D., *Secretary State Board of Health, Concord, N. H.:*

Sir:—Referring to your letter of Sept. 24, 1885, *which has just been received at this office*, you are respectfully informed that inspection service is now being established along the borders of Maine, Vermont, New York, and Michigan. Very respectfully,

JOHN B. HAMILTON,
Supervising Surgeon-General M. H. S.

It will be seen by the above letter that the one from this board to the state department was *just one month* in reaching its proper department, which is certainly a very unfavorable commentary upon the dispatch with which the department of state acted in a matter so vital as that of restricting the importation of a serious and wide-spread epidemic.

On the day of its date, the secretary addressed the following letter to Dr. Hall, one of the inspectors on the Central Vermont Railroad:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Oct. 19, 1885.

DR. A. P. HALL, *Sanitary Inspector M. H. S., St. Albans, Vt.:*

Dear Sir:—Your letter of October 6 was received in due season, but owing to pressure of business I have neglected to answer it until now. I thank you for so kindly informing this board of your work as sanitary inspector. Since your letter was written we have obtained much information concerning the work of inspection along the border. I saw Dr. Austin a week ago to-day and had a long talk with him concerning the work.

I desire to ask one or two questions further concerning the work of the department:—

1. To what extent is fumigation now carried out? Is all baggage coming from Montreal, except, perhaps, that of pleasure travelers and business men, who would not, probably, visit an infected district, fumigated at St. Albans?

It seems to me that among the laboring classes there is no way to make any distinction as regards fumigation. It would be impossible to tell from what locality in Montreal such persons came, as their word could not be taken in the matter with safety. It seems that fumigation has not yet been practiced in this way, unless you have received such an order within a very few days.

2. A word in relation to the issuing of inspectors' tickets. We are much pleased that you have adopted a ticket similar to ours as it gives much information that could not be obtained in any other way. We only wish that all the inspectors would adopt a similar ticket. The inspection ticket, just issued by Dr. Prime, gives us very little information beyond the fact that he has passed the person. No information concerning the baggage of the person is given, or where he came from, hence, with the exception of vaccination, we feel obliged to treat such persons as if they had no inspector's ticket. One or two inspectors do not use any ticket. In my judgment the head of the department is open to criticism in this work. So far as I can learn, it has not given the inspectors such instruction or such aid as it ought to have done, or as the inspectors would have been pleased to receive. The failure to furnish suitable tickets to the inspectors for distribution to inspected persons was a great mistake from the start. This, of course, was evident to you, else you would not have issued tickets at your own expense.

I hope the time is not far distant when the Marine Hospital Service will have perfected the work necessary to restrict the importation of small-pox to an extent that will warrant our board in taking our own inspectors off from the trains.

Very truly yours,

IRVING A. WATSON,
Secretary.

The following reply was received :—

ST. ALBANS, Oct. 20, 1885.

I. A. WATSON, *Secretary N. H. State Board of Health :*

Dear Sir :—Yours of the 19th received. All baggage coming from Montreal, except that of persons that we positively know can be trusted, is held over from 12 to 24 hours for thorough fumigation. All passengers are questioned critically as to where they came from ; if from Montreal, what part of it, their destination, etc. Their coming from Montreal, whether residents of that city or only there for a few hours, passes my punch through letter "A" on the ticket I give them. The laboring classes are especially inspected, and with the help of Custom House Officer Walker, a resident of Montreal, but who comes out every morning, we can readily decide whose baggage needs attention. If the baggage of this class is checked, and we know that it has received attention from the health officer at the depot for that purpose, we pass it along as all right. Persons with much baggage are generally more cleanly in appearance, so that with little questioning we can readily determine as to their safety to travel south of us. Persons who occupy two or three seats, with "big box, little box, bundles, etc.," never fail to get full attention. Their odor tells you that they need it, with emanations from their bodies so dense, at times, as to make the lamp-lights appear a mere flicker, comparatively. The baggage of this class, trunks, boxes, etc., receives 24 hours' fumigation at St. Albans, usually, never less than 12.

Yes, your tickets are just the thing. One of mine—altered from yours—was sent to the surgeon-general's office. He adopted it and ordered some "struck off," as printers say, for the service here. I inclose one of these tickets as altered and adopted by the M. H. S. The "G" on my ticket referred to the number of children vaccinated belonging to party holding the ticket, but on the "adopted ticket" it refers to number of persons vaccinated, including children of the family, I conclude. It would be impossible to get along in this business without issuing just such tickets, which, if intelligently punched, give you full information of the person inspected. Punching "F" may be considered a *favorable* condition of the person's baggage.

I hope, with your board, that the time is not far distant when the Marine Hospital Service will be such as to inspire your full confidence.

Very respectfully,

H. P. HALL,

Inspector M. H. S.

It will be seen from the above letter that the inspector himself did not consider the service by any means perfect, and that up to this time, nearly a month after the service was organized, no thorough system had been developed, and no tickets systematically issued to inspected persons. Information received from other sources, and the work of our own inspectors, thoroughly corroborated this view of the situation.

So long a time had intervened without any material progress in securing better work, that the State Board of Health began to despair of its ever being accomplished. Surgeon Austin was again addressed upon the subject as follows:—

THE STATE OF NEW HAMPSHIRE.
OFFICE OF STATE BOARD OF HEALTH,
CONCORD, Oct. 23, 1885.

H. W. AUSTIN, M. D., *Surgeon U. S. M. H. S., Burlington, Vt.:*

Dear Doctor:—I wish again to call your attention to some points regarding your inspection service on the Canadian frontier, which, if it is the purpose of your department to co-operate with state and local health authorities, it is my privilege and duty to do, and to which, if it is the intention of the Marine Hospital Service to carry on an efficient inspection of persons and baggage coming from localities infected with small-pox, your department cannot make reasonable objection.

The report of Dr. George Cook, inspector for this board, for yesterday (October 20), shows that he inspected 111 passengers from Canada, who were supposed to have been examined by the inspectors of your department, and of this number, 4 had had small-pox, 34 were in possession of physicians' (?) certificates, *10 had certificates issued by your inspectors, and 44 had no certificate whatever.*

Passengers arrive in this state, almost or quite daily, over the Passumpsic Railroad, *via* Sherbrooke, without any inspector's or physician's certificate. In some instances your inspectors do not give a certificate to those that they vaccinate. Your inspectors also give, in some instances, a certificate based upon a certificate which the passenger holds, purporting to have been given said passenger by some physician, without any further evidence of freedom from infection than the paper mentioned.

From these facts, which are daily demonstrated, it is self-evident that, as yet, a thorough reliance can not be placed in the protection which your service is supposed and is expected to give to the New England states against the introduction of small-pox from infected districts in Canada.

Inquiries made of intelligent passengers coming out of Canada, as to how the work of inspection is being carried out, at once cause them to express their distrust and to allege that it is often too hastily and carelessly done to be efficient; hence the public confidence in your work is somewhat impaired.

You probably overlook the fact that we have no knowledge that a person has passed your inspectors, unless a certificate is given him by the inspector; and as we are on the lookout for persons who may enter the state by highway, or who may in some other way have evaded the government inspector, it becomes necessary to our board, and for the convenience of local health authorities, that inspectors' certificates should be issued to *all* who pass the inspectors. Likewise it becomes all important that such a plan should be followed, in order to detect such baggage as might, like the individual, need the attention of the health authorities.

Baggage still continues to arrive in this state from Montreal which has received no attention whatever from your service. Owing to what seems to us to be serious and needless defects in your inspection service, we are obliged to guard our own state against the introduction of small-pox with nearly the same vigilance as we should if left entirely to our own resources, so far as government protection is concerned.

The same feeling is manifested by the health authorities of our own as well as other New England cities, by the action they have deemed it necessary to pursue in the matter of inspection and fumigation. The health authorities of one large Massachusetts city have sought to secure the inspection and fumigation of suspected individuals and baggage destined for that city, by the New Hampshire State Board of Health, because of their lack of confidence in such work by your department.

You will please bear in mind that in representing these facts, we do not criticise you or your inspectors individually, only so far as there is a failure in carrying out the regulations which have been adopted. If the inspector (as was the case) is ordered to fumigate all baggage suspected of carrying the contagion of small-pox and no means are furnished to secure that end, the responsibility rests with the head of the department.

It is not with any captious spirit that this letter is written, but that you may better see wherein you, or your department, can improve your system of inspection. Neither is the feeling which I have expressed in this letter confined to the health authorities of this state.

I trust that you will, so far as you have the power, at once apply a remedy for the defects which have been pointed out. Our board is ready at any time to assist you in any way it can to restrict the introduction of small-pox into the states.

Very truly yours,

IRVING A. WATSON, *Secretary.*

Among the complaints which were made to this board about this time, was one to the effect that conductors of the Pullman cars which came through this state *via* the Vermont Central to Boston, were obliged on their return trip to go to Montreal to make their regular reports to the company, while their cars were allowed to proceed no farther than St. Albans. In the judgment of the board this seemed entirely unnecessary, as such reports could be made from St. Albans as well as from any other point; hence the following letter was addressed to the superintendent in charge of the eastern division of the Pullman Palace Car Co.:—

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, Oct. 19, 1885.

W. H. REED, *Superintendent Pullman Palace Car Service, Montreal, P. Q.:*

Dear Sir:—Some complaints have been made because one or two of your conductors, who run between Boston and St. Albans, are obliged to go to Montreal at the end of each trip to report to you. It gives some uneasiness to the traveling public, and seems to many to be unnecessary, and also attended with a possibility, at least, of bringing back with them the infection of small-pox.

My object in writing this letter is to ask you if some arrangement cannot be made so that this line can report to you from St. Albans, instead of going into Montreal. It would at least allay some apprehensions which the traveling public now have, and especially those who travel along with these conductors.

Very truly yours,

IRVING A. WATSON,

Secretary.

The epidemic had assumed such proportions at this time that it was evident that its progress could be stayed only by the greatest exertions; no avenue could with safety be left unguarded. The season also had arrived when Canadian wood-choppers come into the state for the purpose of securing employment in the various lumber camps. Accordingly the following notice was published in the newspapers in the northern part of the state:—

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, N. H., Oct. 27, 1885.

SMALL-POX IN LUMBER CAMPS.

Messrs. Editors:—We desire to call the attention of lumbermen in the northern part of the state to the hazardous results that would follow the introduction of small-pox into lumber camps where a considerable number of men are employed. Aside from the danger that would accrue to life, it would at once cause a stampede of the men to other localities, thus leaving the contractor or owner without men to carry on the winter's work. A case occurring in a lumber camp would probably have to be quarantined where found, hence it would be next to impossible to keep a force of men after such a case was discovered, or to get new men to take the place of those who would leave. The result would be a suspension of work. The danger is not a fancied one. Small-pox is still spreading in Canada, and whoever employs Canadian labor (or for that matter any other) should make it one of the conditions of hire that the persons so employed *shall be vaccinated before going into any lumber camp.* It should not be deemed sufficient that such person can show a scar on the arm, but *revaccination should be demanded.* If lumbermen will cause such a rule to be carried out, they need have no fear that the dreaded disease will prove a financial loss to them. In vaccination and revaccination there is an absolute certainty that the disease cannot spread.

IRVING A. WATSON,
Secretary.

Upon the above advice, several manufacturers and lumbermen absolutely refused to hire any persons without their first being vaccinated, and bringing to the office of the company a certificate of vaccination from a reliable physician.

A letter was received from Surgeon Austin in reply to that sent him dated October 23, as follows:—

CUSTOM HOUSE, BURLINGTON, VT.,
COLLECTOR'S OFFICE, Oct. 31, 1885.

DR. IRVING A. WATSON, *Secretary New Hampshire State Board of Health, Concord, N. H.:*

Dear Doctor:—Your communication of the 23d inst. has just reached me. I have just returned from a journey along the northern boundary of the state of New York, where I was ordered to organize an inspection service. Your suggestions will receive attention, and I will write you in regard to this matter at my earliest opportunity. I am going to Boston to-night and Monday to Portland, and from there to Island Pond. I shall inspect all stations along the border. I inclose for your information a letter of instruction sent to-day to each inspector at points mentioned. In regard to certificates, you see that each person will be furnished one. Very truly yours,

H. W. AUSTIN,
Surgeon M. H. S.

The following is the "letter of instruction" referred to in the above letter, and although not dated, was issued October 31, as stated in his communication:—

CUSTOM HOUSE, BURLNGTON, VT.,
COLLECTOR'S OFFICE, ——— ——, 188 .

All Montreal baggage must be detained at St. Albans* for disinfection. Certificates of vaccination must not be accepted in any case unless you are certain they are *bona fide* and know the physicians giving them. Inspectors' certificates must be given to each passenger. A strict observance of the above rules by you is required.

TO SANITARY INSPECTORS U. S. M. H. S.

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* St. Albans, Rouse's Point, Newport, Richford, Island Pond.

The above order is significant by way of indirectly admitting that the inspection service was very far from being perfect, even at this late date. It was also the first definite order concerning the issuing of inspectors' certificates, as well as an admission that baggage for fumigation ought not to be selected by simply looking at it. The emphasis placed upon the word "all" indicates that such a conclusion had been reached by Surgeon Austin himself.

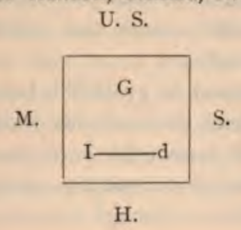
The slowness with which the inspection service was perfected may be better seen by examining our own inspector's report, so far as the issuing of inspectors tickets is concerned. The deficiency in baggage fumigation was daily observed at the fumigation stations at Manchester and Nashua, where baggage of the worst and most filthy type was received daily without any evidence of having been inspected, or even detained for the purpose of fumigation. Up to this time baggage which had been fumigated had not in any way been designated by the officers performing such work, hence local health officers were obliged to examine every piece of baggage arriving from Montreal or other infected localities. It was not until as late as November 20 that any information was received in relation to marking baggage that had been fumigated. Notice of the same was transmitted as follows:—

U. S. MARINE HOSPITAL SERVICE,
NORTHERN ATLANTIC DISTRICT,
PORT OF BOSTON, SURGEON'S OFFICE,
NOV. 20, 1885.

Sir:—The inclosed label (sample) is placed on baggage fumigated by our sanitary inspector on the Canadian frontier.

Very respectfully,
H. W. AUSTIN,
Surgeon H. M. S.

SEC'Y STATE BOARD OF HEALTH, Concord, N. H.



The inclosed label is herewith reproduced, except that it was about two inches square and printed on pink paper, and we venture to assert that the most gifted rebus reader would have failed in giving it is proper interpretation. We were able to translate the letters which surround the square, but after a long and patient study could find no more fitting interpretation for those inclosed within the square than "Grand idiotic display." We have not yet been able to verify this interpretation, since no explanation has been received from the department, and we have not found a local health officer or baggage master who knew what the label meant when he saw it. The simple word "Fumigated" pasted upon a trunk or other baggage would have meant something, and would have been readily understood by all who had anything to do with the baggage.

WORK OF THE MANCHESTER AND NASHUA BOARDS.

The Manchester Board of Health established fumigating rooms in the railroad station at that place, and maintained a very thorough system of fumigation of persons and baggage from October 3 to December 25. This board was no respecter of persons or conditions, inasmuch as all persons who had come from the province of Quebec were regarded as suspicious, and were required to register and be inspected at this station. During the period named the board fumigated one thousand two hundred and sixty persons; of this number four hundred and twenty-one were known to have come from infected districts, and it was conclusively proven that some of them had come from houses where the disease existed, and had served as nurses for those ill with it. The number of trunks fumigated was four hundred and thirty-one; hand-bags, valises, etc., two hundred and sixty-five; boxes containing household goods, provisions, etc., two hundred and two, many of them weighing from six hundred to eight hundred pounds each, constituting, in all, many tons of this class of goods.

Too much praise cannot be given this board for the careful and efficient manner in which the work was conducted. Dr. Geo. C. Hoitt superintended in person the work done at the station, and had a sufficient number of assistants to prevent the escape of any person without inspection, although several attempts were made.

Prior to the establishment of the inspection service, five cases of small-pox and one case of varioloid occurred in Manchester, in a family of emigrants from Canada, who had just arrived in the city. The family was immediately isolated at the small-pox hospital, so the disease did not spread; three of the cases were fatal. These were the only cases that occurred in the state during the year.

The Nashua board also did very efficient work, which cannot be better described than by an extract from their annual report:—

"The labors of this board for the year were very much increased by the epidemic of small-pox, which occurred at Montreal. During the fall, it being deemed advisable to fumigate any and all coming from Montreal or other infested localities, a quarantine was established at the Concord Railroad station. Business began quiet on the 8th of October, but was rapidly increased till the 23d, when twenty-six persons were run through the fumigator, besides the clothing and household goods belonging to the same. Occasionally one was found who was too good to be subjected to the fumigation, but they were generally easily convinced it was for the best after one or two glances at the brass buttons or the badge of the officer present. Very few escaped, although they took various ways of doing so. One colored man, who had come from Montreal, jumped from the train above the Concord station and walked into the city. He was found shortly afterwards and taken back to the station, where he was immediately subjected to the fumes of burning sulphur. After coming out of the fumigator he had made up his mind he would like to leave the state and gain for himself a residence outside of Nashua, as he had never had any, and after fumigation he was at liberty to do as he pleased. Another man coming from Montreal stopped over in Manchester and came in on a train starting from that place. He was disinfected to prevent infection, and save more trouble from fugitives from fumigation, which it did. During the time from October 8 to December 15 inclusive, there were two hundred and ninety-two persons, sixty-five trunks, forty hand-bags, forty-five boxes, most of which were large dry-goods boxes containing household goods, and fifteen sacks fumigated. And here we wish to remember the railroad employés and thank them for their co-operation with us in this work, and their many kindnesses in assisting us in our duty, and in particular the station agent, who placed freight cars at our disposal for the fumigation of household goods when the fumigator was in use."

It is not at all improbable that the work done by the boards of Manchester and Nashua prevented outbreaks of the disease in those cities. The work, so far as we can judge, was heartily indorsed by the citizens of those localities.

REPORT OF RAILWAY INSPECTOR.

Concord, N. H., Jan. 1, 1886.

Dr. Irving A. Watson,
Secretary New Hampshire State Board of Health:

Sir:—I have the honor to submit the following report, as railway inspector. Oct. 1, 1885, I received my appointment and instructions, which were to ascertain what, if any, protection was being given citizens of this state by the United States inspectors along our border, in the epidemic of small-pox that prevailed in the province of Quebec. I was to examine *every* through passenger from Canada, to find out if such had passed the government inspector, to learn whether such passenger came from an infected district or not, if properly vaccinated and baggage fumigated, and place of destination. I began work the same day of appointment, although blanks for daily reports were not ready for use until October 5:—

TABLE.

	Total number inspected.	From Montreal or other infected district.	From other parts of Canada.	Remained in New Hampshire.	Holding U. S. M. H. certificate.	No evidence.
October 5–11 inclusive	252	51	201	78	25	227
October 12–18 inclusive	469	55	414	147	189	280
October 19–25 inclusive	612	87	525	167	406	206
October 26 to November 1	578	67	511	147	279	299
November 2–8	554	105	449	91	360	194
November 9–15	764	227	531	165	710	54
November 16–22	655	211	444	76	628	27
November 23–31	442	139	303	87	427	15
Total	4326	942	3384	958	3034	1302

These tables show the large number that came over two through lines, which were all that centered at this city, and in order to make this inspection it was necessary to travel on the railroad over one hundred miles daily.

As soon as the New Hampshire inspector's certificate was issued here, copies were sent to the government inspectors along the border; they immediately adopted the same, and had some printed for their use, and the same was finally adopted by the U. S. M. H. Service and issued to their inspectors, although it was not until November 1 that all their inspectors were supplied.

We see also from this table that at first either very few came from Montreal or other infected districts, or else the government inspector did not know where they came from. I am inclined to believe the latter to be true, for it was through the kindness of Dr. Young, of the Maine State Board of Health, who had taken great pains to gain information as to infected places in Canada, that the government inspector was able to give us any very certain information on this point.

The column of "no evidence" means all those who came through without being able, at this point, to show me a certificate of having seen or passed the government inspector. Some who were without certificates said they had their certificates in their face, meaning that they had had small-pox; others that they had their certificate upon their arm, meaning that they had been recently vaccinated. But this table will show that the inspector got down to strict business near the latter part of my service.

While not quite one thousand inspected remained in New Hampshire, there were enough of the French Canadian emigrant class coming into our large manufacturing centers to cause the people there to be very uneasy as to the sources of contagion that might be brought to them in the baggage of the emigrants. Vaccination and revaccination were being very well looked after by the government inspector, but fumigation of baggage was not; and it was not until November 18, one month and a half after my work began, that I first saw fumigation certificates upon baggage, although had heard from railroad men of its being done some days before. Our people, however, did not wait all this time, for at Manchester and Nashua the local health officers began fumigating baggage very early, and kept it up all through the height of the epidemic. The reason these officers kept up the fumigation was because they had no confidence in the government fumigation, the orders being, as promulgated by the U. S. M. H. chief to his inspectors, to fumigate all baggage with sulphur. Nothing was said about how much sulphur to use or how long the process should be continued for each fumigation. Thus our local officers frequently found that the fumigation of baggage consisted of dry sulphur being put into the trunks and boxes, while others that had certificates of fumigation upon them, when examined showed no evidence of disturbance, nor was there a *smell* of sulphur about their contents.

Nov. 23, 1885, I went over the St. Albans route and had a chance to see the fumigation process in full operation. My arrival was on the early morning train, and the fumigation had been started the night before. I found a building made of matched boards, about 11 by 12, just outside the depot, constructed for this purpose. All baggage thought worthy of fumigation was put into this room or building by a baggage master, who had charge of fumigation under direction of the sanitary inspector of the U. S. M. H. S. At this visit I found the "smudge house" full of trunks and boxes; some were opened by turning the lid back, boxes had part of cover raised, others were in just the same condition as when shipped, viz., unopened. On my return that same night I met one of the government inspectors, and had a chance to see the method used in inspecting passengers. Every one was examined, and if not recently vaccinated, as shown by personal examination of the arm, they were vaccinated before being allowed to enter the United States. I am sure the inspectors were very painstaking and careful that no guilty man should escape.

While in Montreal, at the station, I learned that the United States custom officers, in their examination, tried to ascertain the place from whence it came, and if from an infected district, or if it were unknown whether infected or not, such box or trunk was marked to be fumigated; all others passed.

Up to the time that my active work ended, Nov. 30, 1885, no fumigation of mails had been attempted. I have learned that about December 16 it was begun by order of the U. S. M. H. S.

I have, in closing, to say that a work so unpleasant as that of a sanitary inspector on our railroads was made more easy by the hearty co-operation of nearly every passenger met. Not one among the French-Canadian class showed any unwillingness to answer all I could ask in French. I was able to get a very fair history for sanitary purposes. Every railroad official, from the highest to the lowest, seemed anxious to aid in the work, and the only unpleasant words spoken were from three Americans who had been in Canada, and returning home had that great privilege, of doing as they had a mind to, interfered with by being obliged to show where they came from and free from all contagion.

And to the president of the board, and to yourself as secretary, I am under great obligations for the confidence shown by my appointment, and for the hearty and cordial assistance rendered me.

Very respectfully,
GEORGE COOK, M. D.,
Sanitary Inspector New Hampshire State Board of Health.

A glance at the table rendered in the inspector's report shows that the government service in the inspection of passengers did not even approximate good work until about three months after the service was established. The service had been in operation over a month before the state board of health placed an inspector upon the lines in New Hampshire. The result of the thorough work done by Inspector Cook shows that not one third of the passengers coming from Canada, during the period of his inspection service, possessed inspectors' tickets, or showed any evidence of having been examined by an inspector. Moreover, it demonstrates the wisdom of not relying upon the government service to protect New Hampshire interests.

We would not be understood as casting any reflections upon the individual inspectors, or placing upon them the responsibility of the failure to do such work as ought to have been immediately inaugurated and efficiently maintained by the government department. The entire fault is with the department in not furnishing such facilities as were requisite for thorough work, and in placing in charge, in a time when the country was threatened with so grave a danger, a surgeon inexperienced in this particular service. The surgeon in charge, Dr. Austin, worked constantly and earnestly to perfect the service which had been placed in his charge, and could have done so much more rapidly had the supervising surgeon-general given him discretionary powers of action in the matter of details. This the surgeon-general did not do, neither did he visit the frontier to obtain a practical knowledge of what was necessary to the immediate and thorough equipment of the inspection service which he had ordered to be established.

It is to be hoped that the time is not far distant when Congress will recognize the absolute inefficiency of the Marine Hospital Service as a health department, and establish a bureau of health that shall have an able and competent sanitarian at its head. Until such time arrives, each state, in order to secure protection against the invasion of epidemics, will have to rely almost entirely upon its own resources. It requires work more substantial than the adroit proclamations of a government official in the public press, to prevent the invasion of cholera or other epidemic disease.

It ought to be a satisfaction to the people of the state to know that the legislature has so well provided for exigencies that we are not obliged to rely upon a national health department that appears to be nearly worthless. We are at the present time able to establish a quarantine or inspection service of our own should circumstances require.

DISINFECTION AND DISINFECTANTS.

In 1884, the American Public Health Association appointed an able committee to investigate the subject of disinfectants, and to give the results of their work in the form of a report. A series of experiments were conducted by the committee to test the value of commercial and other disinfectants. A lengthy report was rendered to the association above mentioned, at its last meeting in Washington, December, 1885. The conclusions arrived at by the committee are represented below :—

> The most useful agents for the destruction of spore-containing infectious material are :—
>
> 1. Fire. Complete destruction by burning.
> 2. Steam under pressure. 110° C. (230° Fahr.) for ten minutes.
> 3. Boiling in water for one hour.*
> 4. Chloride of lime.† A 4 per cent solution.
> 5. Mercuric chloride. A solution of 1 : 500.
>
> For the destruction of infectious material which owes its infecting power to the presence of micro-organisms not containing spores, the committee recommends :—
>
> 1. Fire. Complete destruction by burning.
> 2. Boiling in water half an hour.
> 3. Dry heat. 110° C. (230° Fahr.) for two hours.
> 4. Chloride of lime.† 1 to 4 per cent solution.
> 5. Solution of chlorinated soda.‡ 5 to 20 per cent solution.
> 6. Mercuric chloride. A solution of 1 : 1000 to 1 : 4000.
> 7. Sulphur dioxide. Exposure for 12 hours to an atmosphere containing at least 4 volumes per cent of this gas, preferably in presence of moisture.§

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* This temperature does not destroy the spores of *B. subtilis* in the time mentioned, but is effective for the destruction of the spores of the anthrax bacillus and of all known pathogenic organisms.

† Should contain at least 25 per cent of available chlorine.

‡ Should contain at least 3 per cent of available chlorine.

§ This will require the combustion of between three and four pounds of sulphur for every 1000 cubic feet of air space.

8. Carbolic acid. 2 to 5 per cent solution.
9. Sulphate of copper. 2 to 5 per cent solution.
10. Chloride of zinc. 4 to 10 per cent solution.

The committee would make the following recommendations with reference to the practical application of these agents for disinfecting purposes:—

FOR EXCRETA.

(*a*.) In the sick-room.

For spore-containing material:—

1. Chloride of lime in solution, 4 per cent.
2. Mercuric chloride in solution, 1 : 500.*

In the absence of spores:

3. Carbolic acid in solution, 5 per cent.
4. Sulphate of copper in solution, 5 per cent.
5. Chloride of zinc in solution, 10 per cent.

(*b*.) In privy vaults:—

Mercuric chloride in solution, 1 : 500.†

(*c*.) For the disinfection and deodorization of the surface of masses of organic material in privy vaults, etc.:—

Chloride of lime in powder.‡

FOR CLOTHING, BEDDING, ETC.

(*a*.) Soiled underclothing, bed linen, etc.:—

1. Destruction by fire, if of little value.
2. Boiling for at least half an hour.
3. Immersion in a solution of mercuric chloride of the strength of 1 : 2000 for four hours.§
4. Immersion in a 2 per cent solution of carbolic acid for four hours.

(*b*.) Outer garments of wool or silk, and similar articles, which would be injured by immersion in boiling water or in a disinfecting solution:—

1. Exposure to dry heat at a temperature of 110° C. (230° Fahr.) for two hours.
2. Fumigation with sulphurous acid gas for at least twelve hours, the clothing being freely exposed, and the gas present in the disinfection chamber in the proportion of four volumes per cent.

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* The addition of an equal quantity of potassium permanganate as a deodorant, and to give color to the solution, is to be recommended (Standard Solution No. 2).

† A concentrated solution containing four ounces of mercuric chloride and one pound of cupric sulphate to the gallon of water is recommended as a standard solution. Eight ounces of this solution to the gallon of water will give a dilute solution for the disinfection of excreta, containing about 1 : 500 of mercuric chloride and 1 : 125 of cupric sulphate.

‡ For this purpose the chloride of lime may be diluted with plaster of Paris, or with clean, well-dried sand, in the proportion of one part to nine.

§ The blue solution containing sulphate of copper, diluted by adding two ounces of the concentrated solution to a gallon of water, may be used for this purpose.

(*c*.) Mattresses and blankets soiled by the discharges of the sick:—

1. Destruction by fire.

2. Exposure to superheated steam (twenty-five pounds' pressure), for one hour. (Mattresses to have the cover removed or freely opened.)

3. Immersion in boiling water for one hour.

4. Immersion in the blue solution (mercuric chloride and sulphate of copper), two fluid ounces to the gallon of water.

FURNITURE AND ARTICLES OF WOOD, LEATHER, AND PORCELAIN.*

Washing, several times repeated, with:—

1. Solution of mercuric chloride, 1 : 1000. (The blue solution, four ounces to the gallon of water, may be used.)

2. Solution of chloride of lime, 1 per cent.

3. Solution of carbolic acid, 2 per cent.

FOR THE PERSON.

The hands and general surface of the body of attendants, of the sick, and of convalescents at the time of their discharge from hospital:—

1. Solution of chlorinated soda diluted with nine parts of water (1 : 10).

2. Carbolic acid, 2 per cent solution.

3. Mercuric chloride, 1 : 1000; recommended only for the hands, or for washing away infectious material from a limited area, not as a bath for the entire surface of the body.

FOR THE DEAD.

Envelop the body in a sheet thoroughly saturated with:—

1. Chloride of lime in solution, 4 per cent.

2. Mercuric chloride in solution, 1 : 500.

3. Carbolic acid in solution, 5 per cent.

FOR THE SICK-ROOM AND HOSPITAL WARDS.

(*a*.) While occupied, wash all surfaces with:—

1. Mercuric chloride in solution, 1 : 1000. (The blue solution containing sulphate of copper may be used.)

2. Chloride of lime in solution, 1 per cent.

3. Carbolic acid in solution, 2 per cent.

(*b*.) When vacated:—

Fumigate with sulphur dioxide for 12 hours, burning 3 pounds of sulphur for every 1000 cubic feet of air space in the room; then wash all surfaces with one of the above mentioned disinfecting solutions, and afterwards with soap and hot water; finally throw open doors and windows and ventilate freely.

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* For articles of metal, use Solution No. 3.

FOR MERCHANDISE AND THE MAILS.*

The disinfection of merchandise and of the mails will only be required under exceptional circumstances; free aeration will usually be sufficient. If disinfection seems necessary, fumigation with sulphur dioxide, as recommended for woolen clothing, etc., will be the only practicable method of accomplishing it.

RAGS.

(*a*.) Rags which have been used for wiping away infectious discharges should at once be burned.

(*b*.) Rags collected for the paper-makers during the prevalence of an epidemic should be disinfected before they are compressed in bales by:—

1. Exposure to superheated steam (twenty-five pounds' pressure) for ten minutes.
2. Immersion in boiling water for half an hour.

(*c*.) Rags in bales can only be disinfected by injecting superheated steam (fifty pounds' pressure) into the interior of the bale. The apparatus used must insure the penetration of the steam to every portion of the bale.

SHIPS.

(*a*.) Infected ships at sea should be washed in every accessible place, and especially the localities occupied by the sick, with:—

1. Solution of mercuric chloride, 1 : 1000. (The blue solution heretofore recommended may be used.)
2. Solution of chloride of lime, 1 per cent.
3. Solution of carbolic acid, 2 per cent.

The bilge should be disinfected by the liberal use of a strong solution of mercuric chloride. (The concentrated solution, "blue solution," of this salt with cupric sulphate may be used.)

(*b*.) Upon arrival at a quarantine station an infected ship should at once be fumigated with sulphurous acid gas, using three pounds of sulphur for every 1000 cubic feet of air space; the cargo should then be discharged on lighters; a liberal supply of the concentrated solution of mercuric chloride (four ounces to the gallon) should be thrown into the bilge; at the end of twenty-four hours the bilge water should be pumped out and replaced with *pure* sea-water; this should be repeated. A second fumigation after the removal of the cargo is to be recommended; all accessible surfaces should be washed with one of the disinfecting solutions heretofore recommended and subsequently with soap and hot water.

DISINFECTION AND DISINFECTANTS.

The object of *disinfection* is to prevent the extension of infectious diseases by destroying the specific infectious material which gives rise to them. This is accomplished by the use of *disinfectants*.

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* In order to secure penetration of the envelope by the sulphur dioxide, all mail matter hould be perforated by cutting stamp before fumigating.

There can be no partial disinfection of such material; either its infecting power is destroyed or it is not. In the latter case there is a failure to disinfect. Nor can there be any disinfection in the absence of infectious material.

It has been proved for several kinds of infectious material that its specific infecting power is due to the presence of living micro-organisms, known in a general way as "disease germs," and practical sanitation is now based upon the belief that the infecting agents in all kinds of infectious material are of this nature. Disinfection, therefore, consists essentially in the destruction of disease germs.

Popularly, the term disinfection is used in a much broader sense. Any chemical agent which destroys or masks bad odors, or which arrests putrefactive decomposition, is spoken of as a disinfectant; and in the absence of any infectious disease it is common to speak of disinfecting a foul cesspool, or bad smelling stable, or privy vault.

This popular use of the term has led to much misapprehension, and the agents which have been found to destroy bad odors, *deodorizers*, or to arrest putrefactive decomposition, *antiseptics*, have been confidently recommended and extensively used for the destruction of disease germs in the excreta of patients with cholera, typhoid fever, etc.

The injurious consequences which are likely to result from such misapprehension and misuse of the word disinfectant will be appreciated when it is known that recent researches have demonstrated that many of the agents which have been found useful as deodorizers, or as antiseptics, are entirely without value for the destruction of disease germs. This is true, for example, as regards the sulphate of iron or copperas, a salt which has been extensively used with the idea that it is a valuable disinfectant. As a matter of fact, sulphate of iron in saturated solution does not destroy the vitality of disease germs or the infecting power of material containing them. This salt is, nevertheless, a very valuable antiseptic, and its low price makes it one of the most available agents for the arrest of putrefactive decomposition in privy vaults, etc.

Antiseptic agents, however, exercise a restraining influence upon the development of disease germs, and their use during epidemics is to be recommended, when masses of organic material in the vicinity of human habitations can not be completely destroyed, or removed, or disinfected.

While an antiseptic agent is not necessarily a disinfectant, all disinfectants are antiseptics; for putrefactive decomposition is due to the development of "germs" of the same class as that to which disease germs belong, and the agents which destroy the latter also destroy the bacteria of putrefaction when brought in contact with them in sufficient quantity, or restrain their development when present in smaller amounts.

A large number of the proprietary "disinfectants," so called, which are in the market, are simply deodorizers or antiseptics, of greater or less value, and are entirely untrustworthy for disinfecting purposes.

Antiseptics are to be used at all times when it is impracticable to remove filth from the vicinity of human habitations, but they are a poor substitute for cleanliness.

During the prevalence of epidemic diseases, such as yellow fever, typhoid fever, and cholera, it is better to use in privy vaults, cesspools, etc., those antiseptics which are also disinfectants, i. e., germicides; and when the contents of such receptacles are known to be infected, this becomes imperative. Still more important is the destruction at our seaport quarantine stations of infectious material which has its origin outside of the boundaries of the United States, and the destruction, within our boundaries, of infectious material given off from the persons of those attacked with any infectious disease, whether imported or of indigenous origin.

In the sick-room we have disease germs at an advantage, for we know where to find them, as well as how to kill them. Having this knowledge, not to apply it would be criminal negligence, for our efforts to restrict the extension of infectious diseases must depend largely upon the proper use of disinfectants in the sick-room.

GENERAL DIRECTIONS.

Disinfection of Excreta, etc.—The infectious character of the dejections of patients suffering from cholera and from typhoid fever is well established; and this is true of mild cases and of the earliest stages of these diseases, as well as of severe and fatal cases. It is probable that epidemic dysentery, tuberculosis, and perhaps diphtheria, yellow fever, scarlet fever, and typhus fever, may also be transmitted by means of the alvine discharges of the sick. It is, therefore, of the first importance that these should be disinfected. In cholera, diphtheria, yellow fever, and scarlet fever, all vomited material should be looked upon as infectious; and in tuberculosis, diphtheria, scarlet fever, and infectious pneumonia, the sputa of the sick should be disinfected or destroyed by fire. It seems advisable also to treat the urine of patients sick with an infectious disease with one of the disinfecting solutions below recommended.

Chloride of lime, or bleaching powder, is, perhaps, entitled to the first place for disinfecting excreta, on account of the rapidity of its action. The following standard solution is recommended:—

STANDARD SOLUTION NO. 1.

Dissolve chloride of lime of the best quality in pure water, in the proportion of four ounces to the gallon.*

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* Good chloride of lime should contain at least 25 per cent of available chlorine. (See *ante.*) It may be purchased by the quantity at 3½ cents per pound. The cost of the standard solution recommended is, therefore, less than one cent a gallon. A clear solution may be obtained by filtration or by decantation, but the insoluble sediment does no harm, and this is an unnecessary refinement.

Use one quart of this solution for the disinfection of each discharge in cholera, typhoid fever, etc.* Mix well and leave in vessel for at least one hour before throwing into privy vault or water-closet. The same directions apply to the disinfection of vomited matters. Infected sputum should be discharged directly into a cup half full of the solution.

STANDARD SOLUTION NO. 2.

Dissolve corrosive sublimate and permanganate of potash in pure water, in the proportion of two drachms of each salt to the gallon.

This is to be used for the same purposes and in the same way as Standard Solution No. 1. It is equally effective, but it is necessary to leave it for a longer time in contract with the material to be disinfected,—at least four hours. The only advantage which this solution has over the chloride of lime solution consists in the fact that it is odorless, while the odor of chlorine in the sick-room is considered by some persons objectionable. The cost is a little more.† It must be remembered that this solution is highly poisonous. It is proper, also, to call attention to the fact that it will injure lead pipes if passed through them in considerable quantities.

It will be best to empty the vessel containing excreta and disinfectant into an earthen jar or wooden vessel, and to leave it for twenty-four hours, at the end of which time it may be thrown into a privy vault, or into a hole in the ground excavated for this special purpose.

Disinfection of the Person.—The surface of the body of a sick person, or of his attendants, when soiled by infectious discharges, should be at once cleansed with a suitable disinfecting agent. For this purpose solution of chlorinated soda (*liquor sodæ chlorinatæ*) diluted with nine parts of water, or Standard Solution No. 1 diluted with three parts of water, may be used. A two per cent solution of carbolic acid is also suitable for this purpose, and under proper supervision the use of a solution of corrosive sublimate—1 : 1000—is to be recommended.

In diseases like small-pox and scarlet fever, in which the infectious agent is given off from the entire surface of the body, occasional ablutions with solution of chlorinated soda, diluted with twenty parts of water, will be more suitable than the stronger solution above recommended.

In all infectious diseases the body of the DEAD should be enveloped in a sheet saturated with Standard Solution No. 1, or with a 5 per cent solution of carbolic acid, or a 1 : 500 solution of corrosive sublimate.

Disinfection of Clothing.—Boiling for half an hour will destroy the vitality of all known disease germs, and there is no better way of disinfecting clothing or bedding which can be washed than to put it through the ordinary operations of the laundry. No delay should occur, however, between the time of removing soiled clothing from the person or bed of the sick and its immersion in boiling water, or in one of the following solutions; and no article should be permitted to leave the infected room until so treated.

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* For a very copious discharge use a larger quantity. For the disinfection of solid or semi-solid feces use a solution of twice this strength—8 oz. to a gallon of water—in the proportion of 1 quart for every 4 oz. of material to be disinfected.

† Corrosive sublimate costs about 70 cents a pound, and permanganate of potash 65 cents a pound by the single pound. This makes the cost of Standard Solution No. 2 a little more than two cents a gallon.

STANDARD SOLUTION NO. 3.

Dissolve four ounces of corrosive sublimate and one pound of sulphate of copper in a gallon of water.

Two fluid ounces of this standard solution to the gallon of water will make a suitable solution for the disinfection of clothing. The articles to be disinfected must be thoroughly soaked with the disinfecting solution and left in it for at least two hours, after which they may be wrung out and sent to the wash.

N. B.—Solutions of corrosive sublimate should not be placed in metal receptacles, for the salt is decomposed and the mercury precipitated by contact with copper, lead, or tin. A wooden tub or earthen crock is a suitable receptacle for such solutions.

When diluted as directed, this solution may be used without danger from poisoning through the medium of clothing immersed in it, or by absorption through the hands in washing. A poisonous dose could scarcely be swallowed by mistake, owing to the metallic taste of the solution, and the considerable quantity which would be required to produce a fatal effect.

Clothing may also be disinfected by immersing it for four hours in a two per cent solution of carbolic acid.

Clothing or bedding which cannot be washed or subjected to the action of steam, may be disinfected by exposure to dry heat in a properly constructed disinfecting chamber for three or four hours. A temperature of 230° Fahrenheit should be maintained during this time, and the clothing must be freely exposed, i. e., not folded or arranged in piles or bundles, for the penetrating power of dry heat is very slight.*

The temperature above mentioned will not destroy the spores of bacilli,—e. g., of the anthrax bacillus,—but is effective for the destruction of all disease germs which do not form spores; and there is good reason to believe that this list includes small-pox, cholera, yellow fever, diphtheria, erysipelas, puerperal fever and scarlet fever (?). Moist heat is far more effective, and it is demonstrated that ten minutes' exposure to steam at a temperature of 230° Fahr. will destroy all known disease germs, including the most refractory spores.

In the absence of a suitable chamber for the use of dry heat, fumigation with sulphurous acid gas may be resorted to. The room in which disinfection is practiced should be hermetically closed to prevent the escape of the gas, and three pounds of sulphur should be burned in it for every 1,000 cubic feet of air space. Expose the articles to be disinfected as freely as possible by hanging

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*The limitations with reference to the use of dry heat as a disinfectant are stated in the paper on Dry Heat. (See *ante*.)

them up in the disinfecting chamber, and leave them for at least twelve hours subjected to the action of the sulphurous acid gas.

Soiled mattresses, pillows, feather beds, and articles of this nature cannot be effectually disinfected by sulphur fumigation, owing to the fact that the gas does not penetrate to their interior in sufficient amount. For articles of this kind, and in general for articles of little value, which have been soiled by the discharges of the sick, destruction by fire will be advisable.

Disinfection of the Sick-Room.—In the sick-room no disinfectant can take the place of free ventilation and cleanliness. It is an axiom in sanitary science that it is impracticable to disinfect an occupied apartment, for the reason that disease germs are not destroyed by the presence in the atmosphere of any known disinfectant in respirable quantity. Bad odors may be neutralized, but this does not constitute disinfection in the sense in which the term is here used. These bad odors are, for the most part, an indication of want of cleanliness, or of proper ventilation; and it is better to turn contaminated air out of the window or up the chimney, than to attempt to purify it by the use of volatile chemical agents, such as carbolic acid, chlorine, etc., which are all more or less offensive to the sick, and are useless so far as disinfection, properly so called, is concerned.

When an apartment that has been occupied by a person sick with an infectious disease is vacated, it should be disinfected. The object of disinfection in the sick-room is mainly the destruction of infectious material attached to surfaces or deposited as dust upon window-ledges, in crevices, etc. If the room has been properly cleansed and ventilated while still occupied by the sick person, and especially if it was stripped of carpets and unnecessary furniture at the outset of his attack, the difficulties of disinfection will be greatly reduced.

All surfaces should be thoroughly washed with Standard Solution No. 1, diluted with three parts of water, or with a 1 : 1000 solution of corrosive sublimate. Standard Solution No. 3, diluted in the proportion of four ounces to the gallon of water, may be used. The walls and ceiling, if plastered, should be brushed over with one of these solutions, and subsequently washed over with a lime wash.

Especial care must be taken to wash away all dust from window-ledges and other places where it may have settled, and to thoroughly cleanse crevices and out-of-the-way places. After this application of the disinfecting solution, and an interval of twenty-four hours or longer for free ventilation, the floors and woodwork should be well scrubbed with soap and hot water, and this should be followed by a second more prolonged exposure to fresh air, admitted through open doors and windows.

As an additional precaution, fumigation with sulphurous acid gas is to be recommended, especially for rooms which have been occupied by patients with small-pox, scarlet fever, diphtheria, typhus fever, and yellow fever. But fumigation with sulphurous acid gas alone, as commonly practiced, cannot be relied upon for disinfection of the sick-room and its contents, including bedding, furniture, infected clothing, etc., as is popularly believed.

When fumigation is practiced, it should precede the general washing with a disinfecting solution heretofore recommended.

To insure any results of value it will be necessary to close the apartment to be disinfected as completely as possible, by stopping all apertures through which the gas might escape, and to burn not less than three pounds of sulphur for each thousand cubic feet of air space in the room. To secure complete combustion of the sulphur, it should be placed in powder or in small fragments in a shallow iron pan, which should be set upon a couple of bricks in a tub partly filled with water to guard against fire. The sulphur should be thoroughly moistened with alcohol before igniting it.

Disinfection of Privy Vaults, Cesspools, etc.—When the excreta (not previously disinfected) of patients with cholera or typhoid fever have been thrown into a privy vault, this is infected and disinfection should be resorted to as soon as the fact is discovered, or whenever there is reasonable suspicion that such is the case. It will be advisable to take the same precautions with reference to privy vaults into which the excreta of yellow fever patients have been thrown, although we do not definitely know that this is infectious material.

The most trustworthy agent for this purpose is corrosive sublimate. The amount used must be proportioned to the amount of material to be disinfected. Use one pound of corrosive sublimate for every five hundred pounds (estimated) of fecal matter contained in the vault.

Solution No. 3 diluted with three parts of water may be used. The diluted solution should be applied in the proportion of one gallon to every four gallons (estimated) of the contents of the vault.

All exposed portions of the vault, and the woodwork above it should be thoroughly washed down with the disinfecting solution.

To keep a privy vault disinfected during the progress of an epidemic, sprinkle chloride of lime freely over the surface of its contents daily; or if the odor of chlorine is objectionable, apply daily four or five gallons of Standard Solution No. 2, which should be made up by the barrel, and kept in a convenient location for this purpose.

Recent experiments made by Dr. Sternberg make it apparent that the complete sterilization of large masses of fecal matter in privy vaults would be a difficult and expensive undertaking, if not entirely impracticable. It is, therefore, of prime importance that infectious material should be destroyed before it is thrown into a receptacle of this kind. But it seems also important that during the prevalence of an epidemic the contents of privy vaults should be rendered unsuitable for the development of disease germs by the use of antiseptics, and that, so far as practicable, infectious material not previously disinfected should be destroyed *in situ*. A thorough disinfection of exposed surfaces soiled with the discharges of those who have recently frequented the place, and of the exposed surface of the material in the vault, is perhaps all that will be accomplished by the use of a solution of the bichloride of mercury as recommended; but it is doubtful whether more would be accomplished by the use of any other disinfectant in reasonable quantity, and the superior potency of the bichloride as a germicide and antiseptic seems to the committee to justify the recommendation made with reference to its use in privy vaults. The liberal use of a good disinfecting powder upon the surface of such masses of organic material is also to be commended, and for this purpose chloride of lime diluted with some inert substance, on the score of economy and efficiency, is perhaps the most useful agent.

Disinfection of Ingesta.—It is well established that cholera and typhoid fever are very frequently and, perhaps, usually transmitted through the medium of infected water or articles of food, and especially milk. Fortunately we have a simple means at hand for disinfecting such infected fluids. This consists in the application of heat. The boiling temperature maintained for half an hour kills all known disease germs. So far as the germs of cholera, yellow fever, and diphtheria are concerned, there is good reason to believe that a temperature considerably below the boiling point of water will destroy them; but in order to keep on the safe side it is best not to trust anything short of the boiling point (212° F.) when the object is to disinfect food or drink which is open to the suspicion of containing the germs of any infectious disease. During the prevalence of an epidemic of cholera it is well to boil all water for drinking purposes. After boiling, the water may be filtered, if necessary, to remove sediment, and then cooled with pure ice if desired.

COUNTY ALMSHOUSES.

A constant improvement is being made in the general condition of our county almshouses. In some counties this work has been much more extensive and rapid than in others, but in all there is a yearly improvement that is noticeable. The most marked improvement that has been made during the year is at the Belknap county almshouse. The old jail, as will be seen by referring to former reports of this board was totally unfit for the use to which it was put, has been demolished and a new structure erected. It is built of brick, with railroad iron placed horizontally in the walls so that the spaces between each are only five inches, which precludes the possibility of any person escaping by making a break in the walls.

The building is 50 by 38 feet, with six large double windows. There are sixteen cells, two tiers, 8 by 8½ by 9 feet in size. From each cell there is a ventilating flue extending to the top of the building. There are also a water-closet and water pipes in each cell. The walls of the cells are made in the same manner as the jail walls. The floors of the cells are granite, and overhead in the upper tier of cells are iron plates through which it would be impossible to cut out.

The jail is heated by steam pipes in the corridors. One cell is reserved for a bath-room, and contains a bath-tub provided with hot and cold water.

In the portion of the jail connected with the new wing of the almshouse are two cells for females; these are provided in the same general manner as those above described. The jail is a great credit to the county, and it may be said that the credit was still greater by reason of its not possessing a single prisoner.

A new wing has also been constructed to the almshouse, 36 by 86 feet; this wing was built for the female inmates of the institution. It has been well supplied with all the essential requirements of such a building, bath-tubs, water-closets, etc. The basement is designed for a laundry, and is fitted with stone tubs and connected with hot and cold water. A large drying room has also been fitted up in the basement, besides a special laundry for the family of the superintendent.

Two good-sized rooms have been reserved for hospital purposes. A good number of ventilating flues were provided for in the construction of the building. Another large room was designed and is used solely for a chapel and schoolroom.

A water tank of a capacity of six hundred gallons has been built in the attic of this wing, and two new ones in the attic of the main building, with a capacity of two thousand gallons each. A sewer has been laid from the institution to a point some fifty or seventy-five rods distant in a field below the buildings, where settling tanks have been constructed for the purpose of utilizing the sewage.

The institution contains sixty-four inmates; the average number for the year has been sixty-six. There are ample accommodations at this institution for one hundred inmates, and if filled to the extent that the old house has been, one hundred and fifty could be accommodated.

Important improvements are now under headway at the Rockingham almshouse at Brentwood. A wing is to be built to the insane asylum in place of the wooden wing which is now used.

The building is to be of brick, and provided with such sanitary facilities and appointments as experience has demonstrated to be essential for such an institution. A further description of this building will probably appear in our next report.

REGISTRATION OF VITAL STATISTICS.

A summary of the registration report, such as has been given in former reports of this board, is omitted in this because it is impracticable as well as nearly impossible to obtain the facts necessary for such review in season for publication in the annual report of the board, unless the latter is somewhat tardy in its appearance. Owing to the great amount of labor incurred in compiling the statistical portion of the registration report, several months must necessarily intervene after all the returns have been received before it can be published. A copy of the registration report will be forwarded, upon application, to those who are especially interested in the subject of the registration of vital statistics.

It may be remarked that the registration of vital statistics in this state now approaches very nearly to what is believed to be an accurate record. The law which was passed in 1883, requiring a burial permit in every case of death, has secured a very much better mortality record than it has heretofore been possible to obtain. If the law is strictly enforced in every town and city in the state, as it ought to be, we shall, in a few years, be in the possession of very valuable data for the study of the various causes of death. The information contained in such reports, studied in connection with local conditions, topography, etc., must necessarily lead to the detection of influences which increase or decrease the mortality rates of a given locality, so that in the end what appears to be a useless collection of dry statistics becomes of inestimable value in decreasing the death rate, lessening sickness, and giving a community increased comforts and happiness.

Every town and city clerk should be held responsible for the enforcement of the law in his respective jurisdictions; indeed, very much depends upon the efforts of these officials in securing accurate returns.

CIRCULARS.

During the year several circulars have been sent out for the purpose of obtaining information regarding the prevalence of disease, condition of schoolhouses, etc., etc., which, having no value beyond their immediate function, need not be inserted here. Nearly ten thousand copies of the circular upon the use of disinfectants, which was printed in our last report, were distributed during the year. In many instances the health officers of the town obtained a sufficient number of copies to distribute one to every family in the town, thereby greatly assisting the board in the diffusion of the information contained in the circular.

Under the law existing prior to the meeting of the last legislature, the selectmen had no power to appoint a board of health. Unless such a board was elected at the annual meeting of the town, the selectmen were obliged to act in the capacity of health officers, whether they desired to do so or not. In some towns where an active board of health was necessary and demanded, the selectmen acknowledged their incompetence as health officers and desired some amendment to the existing laws so as to allow the selectmen to appoint a board of health. Such a law was enacted, as will be seen below.

The selectmen and health officers of every town in the state were notified of the passage of this law by the following circulars: —

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,

CONCORD, April 21, 1886.

To the Board of Selectmen :

Gentlemen :—We desire to call your attention to chapter 14 of the Pamphlet Laws of 1885. You will see that it gives the selectmen power to appoint a board of health, if one has not already been provided for by election or appointment.

It is important to the welfare of the people of the state that every town should have an efficient board of health, and where such board has not already been created, the selectmen should appoint, unless they are willing to serve actively in that capacity themselves. The following is the law mentioned :—

AN ACT to render more efficient the Health Laws of the State.

Be it enacted by the Senate and House of Representatives in General Court Convened:

SECTION 1. The selectmen of any town that has neglected to elect a health officer or officers may appoint one or more health officers for said town, as in the judgment of the selectmen may be necessary; but if no health officer or officers shall have been elected or appointed, it shall, upon the petition of ten or more legal voters, be the duty of the selectmen to appoint one or more health officers, as in their judgment may be necessary.

SECT. 2. The state board of health may make, in addition to the rules and regulations of local health officers, such other rules and regulations, or may make such amendments to existing rules and regulations as in the judgment of the board the public good may demand, and such rules and regulations shall be enforced by the health officers in the same manner as other health regulations.

SECT. 3. Health officers or local boards of health shall furnish the state board of health with such information as may be called for from time to time concerning the work of such health officers or local boards of health, and a copy of all rules and regulations issued by such health officers or local boards of health shall be forwarded to the state board of health when issued.

SECT. 4. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

SECT. 5. This act shall take effect upon its passage.

[*Approved July 23, 1885.*]

It is a well proven fact that the death rate of a place has often been reduced by the efficient work of a health board, and we believe that nothing will contribute more to the prosperity of the citizens of New Hampshire than the enforcement of sanitary principles and laws.

Very truly yours,

IRVING A. WATSON,
Secretary.

THE STATE OF NEW HAMPSHIRE.

OFFICE OF STATE BOARD OF HEALTH,
CONCORD, May 8, 1886.

To Health Officers and Local Boards of Health:

We wish to call the attention of health authorities to chapter 14 of the Pamphlet laws of 1885, which is as follows:—

AN ACT to render more efficient the Health Laws of the State.

Be it enacted by the Senate and House of Representatives in General Court Convened:

SECTION 1. The selectmen of any town that has neglected to elect a health officer or officers may appoint one or more health officers for said town, as in the judgment of the selectmen may be necessary; but if no health officer or officers shall have been elected or appointed, it shall, upon the petition of ten or more legal voters, be the duty of the selectmen to appoint one or more health officers, as in their judgment may be necessary.

SECT. 2. The state board of health may make, in addition to the rules and regulations of local health officers, such other rules and regulations, or may make such amendments to existing rules and regalations, as in the judgment of the board the public good may demand, and such rules and regulations shall be enforced by the health officers in the same manner as other health regulations.

SECT. 3. Health officers or local boards of health shall furnish the state board of health with such information as may be called for from time to time concerning the work of such health officers or local boards of health, and a copy of all rules and regulations issued by such health officers or local boards of health shall be forwarded to the state board of health when issued.

SECT. 4. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

SECT. 5. This act shall take effect upon its passage.

[*Approved July 23, 1885.*]

By virtue of the authority vested in the state board of health by section 2 of the above act, it is hereby ordered that, in the rules and regulations adopted by any town or city board within the limits of the state of New Hampshire, the following shall be inserted and included, and that no rule or regulation which will in any way impair the meaning or force of the same shall be adopted by any town or city :—

1. No public funeral shall be held in any instance where the deceased died of small-pox, scarlet fever, or diphtheria.

2. No pupil shall attend any school, public or private, from a house or family where there exists a case of scarlet fever or diphtheria, unless such case or cases are thoroughly isolated from the said pupil, and then only upon the certificate of a physician, certifying to the fact that such isolation is secured, and that in his judgment no liability to spread the disease will follow.

3. No person who has had scarlet fever or diphtheria shall attend any school or other public gathering until three weeks after convalescence has been established, except upon the certificate of a reputable physician.

These regulations are made because sufficient precautions have not been exercised in the past in relation to scarlet fever and diphtheria, both contagious diseases, and each destroying annually lives that might have been saved by the enforcement of reasonable precautionary measures. These diseases have in the last three years taken the lives of over seven hundred persons, mostly children, in New Hampshire. Heart-rending and appalling as is this fact, it is lamentable that it should become necessary to invoke the strong arm of the law to prevent parents from exposing their children, themselves, and others to these terrible diseases.

Not only should the above rules be enforced, but those having either of these diseases should be as carefully secluded from those not afflicted as if it were small-pox, and we most earnestly recommend the adoption of every known measure to lessen the mortality rates of these diseases.

In addition to the above rules, the local board may, and should, if it is an active one, require all physicians to report to it all cases of scarlet fever, diphtheria, or other contagious disease (chapter 112, General Laws), that the board may act intelligently and promptly in such cases.

Physicians should be required to report immediately all deaths from these diseases, that regulations regarding funerals may be thoroughly enforced.

It is not practicable to formulate a complete set of rules that would be applicable to every locality; yet there are certain general regulations that every board should adopt, and which are indicated in the General Laws. Public nuisances of all kinds should be prohibited; slaughter houses, rendering establishments, offensive vaults and cesspools, decomposing refuse, etc., should not be allowed in compact parts of towns or cities.

Verbal complaints made to a board of health should be recognized and acted upon as promptly as though they were made in writing. The organic duty of a board of health is to protect the health interests of its jurisdiction, and no complaint relating to any nuisance or condition that requires immediate abatement should be ignored by reason of any informality in making the same known to the health authorities. As well might a fire department require a written notice under date that a fire was actually under headway at a certain street and number before proceeding to the locality, as for a board of health to demand a written notification when verbally informed of a disease-breeding nuisance that should be *immediately* removed.

Every board of health, in accordance with section 3 of the above law, is requested to forward to this office a copy of any rules or regulations it may issue. We would suggest that they be submitted to this board for approval before being printed.

We shall deem it a pleasure, as well as a duty, to assist and advise any local board of health in the state in respect to any question or questions upon which such advice is requested.

We would like to see an active board of health in every town in the state; a passive one is only an incumbrance.

Per order.

IRVING A. WATSON, *Secretary.*

Several boards of health were appointed immediately after the passage of this act, and vigilant sanitary work at once commenced where nothing had been done under the old law.

We have frequently been asked to furnish local boards with some suggestions as to rules and regulations which such board is supposed to publish. In order to furnish a form that will be applicable to nearly all localities in the state, we give below the rules and regulations of the board of health of Claremont, which are excellent and embrace all that is required in such a place:—

RULES AND REGULATIONS

OF THE BOARD OF HEALTH OF THE TOWN OF CLAREMONT.

In pursuance of authority given in section 1, chapter 3, General Laws of the State of New Hampshire, we, the undersigned, officers of the Board of Health of the town of Claremont, do hereby establish the following rules and regulations, which we deem necessary for the better preservation of the public health and the best interests and welfare of the community, namely:—

RULE I.—PRIVIES AND VAULTS.

No person shall occupy, lease to, or permit any other person to occupy any building as a dwelling-house, unless such building be provided with privies and vaults, and so constructed that none of their contents may escape to contaminate the surrounding earth or be exposed to the light. No person shall erect or continue such place of easement so near to any other dwelling that it may become offensive. Proper deodorizers or disinfectants shall be used at all times to prevent fermentation. All vaults shall be cleansed and disinfected at least twice a year; in the spring not later than May 15, and in the fall not earlier than the 1st of October. Any deviation from this order shall not be allowed except by permission of the board.

RULE II.—DRAINAGE.

Suitable drains and sewers shall be constructed so that sink-water, or any other liquid that may by exposure become putrid and offensive, may be conveyed away and disposed of in such manner that they may not pollute the water of any spring or well by saturating the earth in their vicinity, or contaminating the air, and if such refuse matter or sewage be collected in hogsheads, cisterns, or other receptacles, they shall at all times be deodorized and disinfected thoroughly, so as not to disturb the comfort or endanger the health of any person living near.

RULE III.—COLLECTION OF OFFAL.

The collection of refuse matter in or around the immediate vicinity of any dwelling-house, place of business, or public highway, such as swill, waste of meat, fish or shells, bones, decaying vegetables, dead carcasses, excrement, or any kind of offal that may decompose and generate bacteria or unhealthy gases, and thus affect the purity of the air, shall be considered the worst kind of nuisance, and must be removed or disposed of either by burial, burning, or conversion into fertilizers, and in such manner that it may not be offensive to the neighborhood wherever located.

RULE IV.—STABLES.

Stables, pig-sties, and all other places where animals or fowls are confined, if in proximity to dwelling-houses, places of business, or public highways, may, without proper care for cleanliness and ventilation, become nuisances, and will receive the attention of the board of health.

RULE V.—OVERCROWDING TENEMENTS.

The crowding of tenement houses will receive our special attention, as one of the greatest sources of danger in generating contagious diseases. Owners of such property showing a disregard of this matter will meet with the severe disapproval of the board, and, if any disease shall arise from such cause, the owners will be prosecuted in accordance with the laws of the state board of health.

RULE VI.—CONTAGIOUS DISEASES.

The following are contagious diseases: Small-pox, diphtheria, and scarlet fever.

RULE VII.—ATTENDING PUBLIC GATHERINGS.

It shall be unlawful for any person who has become affected with any contagious or infectious disease, or who is recovering from such disease, or for members of the same household, to attend school, church, or any public gathering, or to mingle in society in any way, until the board of health or some person designated by them certifies that they are no longer liable to communicate said disease.

RULE VIII.—ISOLATION.

Isolation of persons affected with contagious diseases will be ordered immediately upon the appearance of said disease, and be rigidly enforced.

RULE IX.—VACCINATION.

No child shall be allowed to attend any public school without presenting a certificate of vaccination from a legally qualified physician, stating that said child, or person, has been vaccinated within the last seven years.

RULE X.—REPORTS OF PHYSICIANS.

It shall be the duty of every physician who attends upon any person infected with the small-pox, scarlet fever, or diphtheria, to immediately report the same to the health officers of this town, together with the residence of such persons so infected.

RULE XI.—NEGLECTING REPORTS.

If any physician shall neglect to report immediately any case or cases of small-pox, scarlet fever, or diphtheria, he shall forfeit the sum of one hundred dollars, to be recovered by such health officers in the town.

RULE XII.—REPORTS OF DEATHS.

It shall be the duty of every physician to report immediately to the health officers the death of any patient from small-pox, scarlet fever, or diphtheria, together with the residence of said person.

RULE XIII.—FUNERALS.

Public funerals are prohibited for any person who has died of small-pox, diphtheria, or scarlet fever.

RULE XIV.—OCCUPATION.

If any person shall use or occupy any building in the compact part of this town, or in the immediate vicinity of any dwelling-house, place of business, or public highway, for a slaughter-house, fish market, for trying tallow, or for currying leather, or for the deposit of green pelts or skins, or for the carrying on of any offensive business, without permission in writing of the health officers of this town, he shall be guilty of maintaining a nuisance.

Approved April 6, 1886.

ISAAC H. LONG,
M. S. ROSSITER,
HENRY C. SANDERS,
Selectmen of Claremont.

H. W. PARKER,
O. B. WAY, M. D.,
C. W. TOLLES, M. D.,
Board of Health.

EXPENSES.

The following are the expenses of the year chargeable to the annual appropriation:—

Salary of secretary	$2,000.00
Salary of clerk	375.85
Traveling expenses, etc.	383.55
Office accessories	147.30
Library	104.00
Analysis of water and foods	100.50
Printing	66.75
Inspector's services not charged to epidemic fund	60.00
Telegraph and telephone	28.85
Total	$3,266.80

The small-pox epidemic considerably increased the expenses of the board. Numerous items which might have been charged to the epidemic fund created by the legislature, were assumed by the board in order to keep the fund named as large as possible, with which to meet future contingencies.

The following shows the amount of the fund as it now stands:

EPIDEMIC FUND.

Appropriation by the legislature of 1885 . .	$5,000.00
Amount used for inspection services in the small-pox epidemic	260.50
Balance in hands of state treasurer . .	$4,739.50

It is hoped that no occasion will arise that will make a demand upon this fund, but there is an increased sense of security in having this ample provision for any epidemic that may invade our state.

There are several other subjects which might with propriety be taken up and discussed in the report of the secretary, but it is believed that the space is more valuable for the special papers which will be presented in this volume. It is impossible in a report of this style to take up in a single year all the questions connected with the public health. The subject of water pollution, which has been discussed to some extent in our previous reports, is omitted in this for the reason just mentioned. It is, however, more or less extensively discussed in the special papers which follow.

A large amount of detail work of the board for the same reason is not represented. The greater part of such work is of local importance only. It has been our aim to present only such matter as is of public interest, and we trust that this volume will be received with the hearty commendation that has been bestowed upon the previous reports of this board.

Respectfully submitted.

Irving A. Watson.

Secretary.

AMERICAN PUBLIC HEALTH ASSOCIATION.

THIRTEENTH ANNUAL MEETING

REPORTED BY G. P. CONN, M. D., DELEGATE FROM THE STATE BOARD OF HEALTH.

The association met in Willard's Hall, in the city of Washington, December 8, the president, Dr. J. E. Reeves, of West Virginia, in the chair.

The occasion called together a large assembly from all parts of the country east of the Mississippi, and all the states bordering on the river on the west, as well as the whole gulf coast, were represented. Canada was well represented, as the province of Quebec and the province of Ontario both sent delegates.

The association being composed of those who are interested in sanitary science, receives a substantial support from the health boards throughout the Union, both local and state health authorities being interested in an united effort to accomplish more than can be done individually.

While the medical profession has the larger number of members in the association, yet all professions and vocations have a good representation. The fact that it is supported by membership fees alone, and that its members spend so much time and money in a work the object of which is to prevent disease, prolong life, and render the visits of the angel of death less frequent, shows a disinterestedness in their work as well as a proof of earnestness and faith in its great usefulness.

After the ordinary routine business incident to the opening of the meeting was over, the first paper was read by Dr. E. M.

Hunt, of Trenton, N. J., in which he discussed the various terms now used in sanitary, statistical, and parasitical nomenclature. He was followed by Dr. John S. Billings, of Washington, D. C., in a lengthy paper on "Forms for Tables on Vital Statistics." After discussing different forms now in use, he proceeded to explain what ought to be included in or rejected from such tables. Vital statistics are furnished to the public through the press, and he urged that it was the wisest course for the health officers to furnish full and accurate reports of prevailing sickness and deaths every week, so far as he has the data to do so, and thus avoid the responsibility of concealment. Dr. Billings said there were several sources of information with regard to the amount and character of disease prevailing in a city of which the health officer can, with a little tact and management, avail himself, and which are too much neglected. There are the public dispensaries and other institutions for the treatment of the sick, including the city physicians to the poor, the prisons, reformatories and asylums, and the public schools. From all of them which are supported from the public funds he should be able to obtain reports showing the amount and character of the diseases coming under their notice. In conclusion, attention was called to the importance of using graphic representations of the results of studies of vital statistics, to be given in the form of diagrams and shaded maps, which, although rather expensive, would be much more satisfactory and cheaper in the end.

An interesting paper followed, upon "The Relations of Rainfall and Water Supply to Cholera," by Dr. Henry B. Baker, of Lansing, Mich., which showed that where the water supply was good and the rainfall abundant, cholera was greatly decreased.

"The Virus of Hog Cholera" was the subject of a paper read by Dr. D. E. Salmon, D. V. S., of Washington, D. C. He said that during the present year the ravages of hog cholera have been unusually widespread and severe, costing the country nearly $30,000,000. The disposition of the millions of carcasses of hogs that have died from this disease is a matter which affects the health of our people. Sometimes the carcasses are left to putrefy in the open air, to be preyed upon by carnivorous animals and birds; sometimes they are thrown into the ponds and streams which furnish drinking-water to our cities; sometimes the lard is rendered from them, and what finally becomes of this product is an interesting subject for speculation. Only exceptionally are the carcasses buried or burned. The study of virus is of peculiar interest to us at this time, because of its bearing upon the general subject of contagion. The science which treats of this important class of phenomena is still in its infancy, but experiments are in progress which will undoubtedly result in decreasing the disease.

At the conclusion of Dr. Salmon's paper, Hon. Erastus Brooks, of New York, said this was a commercial as well as a sanitary question. He referred to the action of the French and German authorities in prohibiting the importation of American pork. He heartily agreed that the subject should be further discussed. Dr. T. S. Verdi, of Washington, said the assumption that our animals arrived in Europe in a diseased condition was only an excuse to keep out the American cattle.

Mr. Brooks said that while this was probably true, it was not the whole truth. The alleged improper packing of pork, rendering it unfit for use when it arrived in France, was the avowed cause of the prohibition in France. He referred to the tariff duties imposed here as tending naturally to retaliatory measures. He thought it was our duty to see that food sent abroad was properly packed. Dr. R. Harvey Reed, of Ohio, offered a resolution recommending legislation, national, state, and municipal, to provide protection for the people against the sale of diseased meat. The resolution was referred.

Dr. J. Berrien Lindsley, the treasurer, reported that the receipts for the year amounted to $3,338.13, and the disbursements to $2,233.10, leaving a cash balance on hand of $1,105.03.

The committee which was appointed at the last meeting of the association to examine the subject of disinfectants, antiseptics, and germicides in their relation to preventive medicine and sanitation, made a printed report through its secretary, Mr. George Rohé, of Baltimore, which was referred to the executive committee.

EVENING SESSION.

The evening session was open to the public and a large number of resident doctors brought their ladies with them. On the platform were Commissioners Edmonds and Webb, Representative R. W. Townshend, Dr. Smith Townshend, Dr. Sunderland, and twelve ex-presidents of the association. The session was commenced by the introduction of Dr. Toner to the audience to deliver the speech of welcome to the members of the association He prefaced his remarks by stating that he had hoped that President Cleveland would have been present at this meeting, but he had received an autograph letter from him which he would ask the secretary to read. It ran as follows :—

EXECUTIVE MANSION,
WASHINGTON, Dec. 7, 1885.

DR. J. M. TONER :

My Dear Sir :—I am sorry that the condition of the public business is such that I cannot accept the invitation which you kindly tendered me on behalf of the American Public Health Association, to attend its annual meeting to-morrow evening.

I beg to assure you that my expression of regret is not merely formal, but actually indicates a sense of deprivation which attends an inability to give by my presence, as requested, the fullest indorsement of the objects and purposes as well as the works of the association.

Surely the advancement of sanitary science and its practical application to the public health are of immense importance to the people of our land. Of course the value of efforts in the direction of a better understanding of the causes of disease and protection against the same is too palpable for suggestion or argument. But I do not think the advantages of an improvement in the condition and sanitary surroundings of the homes of our workingmen and the poor among us are sufficiently appreciated. Healthful and comfortable habitations indicate the best features of a country's prosperity and advancement, and men with good health and wholesome surroundings are apt to be contented and useful citizens.

The difference in the death rate of cities and localities unexplained by natural and inherent causes is of itself enough to give great prominence to the work of the association, and if this beneficent organization shall succeed, as it ought, in impressing upon municipalities the duty of sensible and thorough sewerage, a plentiful and pure supply of water and general cleanliness, together with a proper construction of school-buildings for the children of their citizens, it may well point with pride to its achievements.

With the hope that the association may be the means of constantly increasing benefit to the country, and with expressions of heartiest sympathy with its work,

I am, yours sincerely,

GROVER CLEVELAND.

At the conclusion of the reading, President Cleveland was immediately elected an honorary member of the association by acclamation, he being the first gentleman to whom this honor had been given.

Dr. Toner then proceeded with his speech, which was an eloquent tribute to the value of the work being done by the American Public Health Association. Its mission is eminently humane and world-wide in its sphere. He hoped that the members of the association, during their stay in Washington, would make themselves just as much at home as though they were mingling with the members of their own families.

Upon the conclusion of Dr. Toner's address, which was warmly applauded, he introduced Judge Edmonds, the president of the board of commissioners, who in a happy vein spoke hearty words of welcome to the delegates. He dwelt upon the contrast afforded by the knowledge of the present day with the ignorance and alarm of former ages aroused by the presence of a pestilence. Then such a visitation was regarded as a mysterious visitation of Providence; but now sanitary science pointed out the filthy streets, or stood at quarantine stations and received the disease as it came from other parts, and mitigated the horror and suffering of such an invasion. He said that every consideration of humanity urged them forward. There may be temporary failures, but progress will be made as in the past, and the association is entitled to liberal appropriations and the co-operation of every municipality in the land, and nowhere, added Judge Edmonds, will such co-operation be granted more cheerfully than here at the capital city.

In the absence of Senator Harris, who was detained in committee work, and the unavoidable detention of Representative Lewis Beach, who were both expected to speak, Dr. Toner called upon Representative Townshend, who was upon the platform, to make a speech. At first he refused, but the repeated calls of the audience eventually brought him to the front. "It is not only from modesty," said he, "that I do not wish to speak before this enlightened and scientific audience, but because I have nothing to say. If I were to attempt it, I should only disappoint my friends and gratify my enemies. I therefore ask you to accept the eloquent speech to which you have just listened from my friend, Judge Edmonds, as expressing my sentiments."

The president, Dr. James E. Reeves, then delivered his annual address. He invited the attention of his audience to subjects which have encouraged the most industrious energies of his life, namely, the public health. After paying a high compliment to the local committee of reception for the excellent program which had been arranged, he said that every assembly such as he addressed, moves forward another day's journey the ark of the sanitary covenant, and humanity is bettered and made happier hereby. In these days of political struggle and divers interests, we hear much of the various means for the advancement and protection of the agricultural, manufacturing, mercantile, and many others of less extended importance. What question of mere business interest can compare, either in importance or extent, with the general and individual interest which every man has in the preservation of health and life? The national legislature is liberal in many matters and ought to be equally liberal in providing for the public health. On this point he said:—

> "We are to-day at the very threshold of great possibilities in preventive medicine, and the central government should foster every effort for the success of the work in which sanitarians are so heartily engaged. To aid them in the study of contagious and infectious diseases, both among human beings and animals, and the blights upon the crops, a national biological laboratory should be provided; and no other place would be so well suited for the location of such a school of science as the new building now in process of erection for the Army Medical Museum and Library. With a thoroughly equipped national school of biology, our scientists would not then have to visit laboratories abroad—to Pasteur, in Paris; Klein, in London, and Koch, in Berlin; neither should we then see our distinguished Sternberg quartered at the Johns Hopkins University, in Baltimore, for favorable facilities for the study of micro-organisms in relation to diseases."

Dr. Reeves expressed the hope that the present Congress would be influenced to establish a health bureau, which would prove a blessing to the whole country.

WEDNESDAY.—MORNING SESSION.

After the meeting was called to order the usual routine business was disposed of and the reading of papers commenced. The first paper read was entitled "Small-pox in Canada and the Methods of Dealing with it in the Different Provinces," by Dr. P. H. Bryce, secretary of the Provincial Board of Health, Toronto, Ontario. After stating that he felt like a lawyer before a criminal court, pleading for a criminal who has boldly declared himself "not guilty" of an epidemic of small-pox, the speaker proceeded to relate the circumstances of the outbreak of the present year, stating that it was not until a prominent politician had died from the disease that the entire outside world and Montreal herself awoke to the situation. The number of deaths was about 3,100, or about one to every infected house. Unfortunately the epidemic was not confined to Montreal alone. Among the French the system of sanitation was unable to grapple with the disease. Knowing this, the health authorities of Montreal provided the local boards of health with instructions, and did everything in their power to warn them of their danger. The speaker described in detail the special regulations which were drawn up by the Ontario authorities, and the means taken to prevent the spreading of the epidemic. All goods, merchandise, and people passing in or out of the province were strictly examined.

The railways lent ready aid in the cause of inspection, and every car was examined and all the railway officials vaccinated. Merchandise certificates were issued and the merchants availed themselves gladly of this system, which prevented the cancelling of a large number of their orders. Passengers were asked if they came from Montreal, what street and number, and if it was found that they came from near an infected house, their baggage was taken and fumigated and themselves quarantined for a time.

In the province of Quebec equal precautions were taken to prevent the spreading of the epidemic. In conclusion, the speaker said he thought it very creditable to Ontario that it had succeeded in establishing an internal quarantine through which no case of disease had passed to the neighboring states. He thought that the common sense of justice of the association would lead it to agree with him that the unreasonable continuance of the quarantine at the suspension bridge should be removed. Dr. Hingston, chairman of the Provincial Board of Health of Quebec, opened the discussion as follows :—

"I have a statement to make, at which I hope the most timid will not be alarmed," said Dr. Hingston, of the province of Ontario, ascending the platform. "I am from Montreal. [Laughter.] My city has been afflicted as no other city on this side of the Atlantic has ever been afflicted; but I must say that no city could have made more tremendous efforts to free itself of its affliction." Continuing, he said it was through the aid of the United States that the rules for vaccination were enforced more thoroughly than could otherwise have been possible, and he took the occasion to thank the Union for its assistance. Montreal had to create legislation for itself on account of its distance from the seat of government, but these rules were sent by special messenger to Quebec, and within forty-eight hours they were law. No province could have done more to rid itself of its epidemic than had Quebec. There were no small-pox hospitals or isolated buildings in which patients could be placed, until the outbreak of the disease. Disinfection, according to the most modern methods, was employed. The speaker then described the opposition which the health authorities had met with in their efforts for inspection and disinfection.

"The deaths from small-pox in Montreal," said he, in conclusion, "numbered, as has been stated, three thousand. But by the death of three thousand children it must not be supposed that it means three thousand houses in mourning. In some of the states, I believe, there is one child to two or three houses [laughter], and in such places this number of deaths would affect about six thousand homes. Now our birth rate, I am happy to say, is enormous. No country in the world can exceed it. [Laughter and applause.] I am glad to see, gentlemen, that you approve of this. [Laughter.] So if you will divide the three thousand deaths by five or six, you will probably get the number of houses to-day in mourning in Montreal."

A DISCUSSION ON VACCINATION.

"I consider it a crime for a community to have small-pox," said Dr. A. N. Bell, of New York. "These men who have just spoken talked of the hardship of quarantining them; they deserve it. This epidemic did not come because Montreal is a filthy city, but on account of the bad system of vaccination in use there, and it is this and the men who use it that I denounce."

Dr. O'Connor, of Holyoke, Mass., told of an ordeal through which he himself had passed in his own town several years ago. An epidemic struck the town, and people were dying on every side. A compulsory vaccination law passed, and the epidemic was subdued within three weeks.

"I am here," he said, "to bear witness to the immense benefits derived from vaccination."

"I am in favor of a compulsory vaccination law for the whole of this country," said Dr. B. James, of Philadelphia.

"I would like to call attention to one point which has not yet been touched upon," said Dr. James A. Stewart, "and that is the danger resulting from public funerals of persons dying from epidemics."

Dr. Newell thought persons ought to be vaccinated two or three times, if necessary, or until the last operation produces no result. He had adopted a system of vaccinating twice on each arm. Care was necessary to know what vaccine was employed, as in New York he had found a manufactured vaccine virus which was very injurious.

IMPURE AIR AND UNHEALTHY OCCUPATIONS.

A valuable paper on "Impure Air and Unhealthy Occupations as Predisposing Causes of Pulmonary Consumption" was read by Dr. C. W. Chancellor, secretary of the Maryland State Board of Health. He stated that in England one fifth of all the deaths occurring are from pulmonary consumption; in France, one sixth; and in Germany and Austria, about one seventh. In the census year of 1880 one eighth of the deaths occurring in this country were from consumption. The causes which lead to this fearful mortality demand more than ordinary consideration.

Pure air is as essential to the health and vigor of the animal system as wholesome food and drink. When contaminated by stagnation, by breathing, by fires or artificial light, such as candles, lamps, and gas, it operates as a slow poison and gradually undermines the human constitution. Because air is an invisible susbstance and makes little impression on the organs of sense, people seem to act as if it had no existence. Too little attention is paid to proper ventilation of living apartments. In some houses the windows are unopened for weeks and months together. Crowds of tailors, seamstresses, weavers, shoemakers, and other mechanics employed in sedentary occupations, are frequently pent up from morning to night in close and sometimes damp apartments, without even thinking of opening their windows for a single half-hour for the admission of fresh air. Consequently they are continually breathing an atmosphere highly impregnated with the noxious gas emitted from the lungs and the effluvia perspired from their bodies, which is most sensibly felt by its hot suffocating smell when a person from the open air enters into such apartments. The sallow complexions of such persons plainly indicate the injurious effects produced by the air they breathe; and although its pernicious effects may not be sensibly felt, it gradually preys upon their constitutions, and often produces incurable consumptions, which are frequently imputed to other causes.

It cannot be denied that some occupations are more unhealthy than others. There can be no doubt that the inhabitants of cities are less hardy and more subject to pulmonary disease than those of the country. City people, speaking generally, are pale, of lymphatic temperaments, and their muscular system is but poorly developed. Want of a free circulation of a pure, uncontaminated atmosphere is the most powerful cause of this. In addition to this, in cities the passions are more excitable; indulgence in eating and drinking is more common; with many life is sedentary, and the occupations are altogether more unhealthy than those in the country. Take, for example, those engaged in mercantile life, merchants and clerks. These, for sanitary purposes, may be divided into three classes: first, those who have but little exercise, such as book-keepers; second, those who have exercise but are confined to their stores in a superheated, unhealthy atmosphere, as, for example, salesmen; and third, those who have exercise in the open air, or who do outdoor work. In the first class the digestive organs suffer; the next, from diseases of the pulmonary organs; and the third, from the prostrating effects induced by over mental or bodily exertion, or by corroding care.

Salesmen are liable to their diseases because they are constantly exposed to their exciting causes, the principal of which are an impure atmosphere and exposure to sudden changes of temperature.

Referring to artisans and laborers who work in manufactories and shops, many of which are badly located, badly ventilated, and often abounding in unhealthy dust, under such circumstances, said the speaker, the most substantial nourishment, the most temperate habits cannot prevent their becoming blanched and weakened by disease. Persons habitually breathing a dust-laden atmosphere, as in some manufactories, are more especially liable to pulmonary complaints. The average duration of life among the dry grinders of forks is twenty-nine years; of razor grinders, thirty-one years; edge-tool grinders, thirty-two years; knife and file grinders, thirty-five years; and saw and sickle grinders, thirty-eight years. In every hundred sick among the needle makers seventy are consumptive, and among the file makers, sixty-two; and taking the steel grinders all around, rather over forty in the hundred are consumptive, while one-half of the lithographers — workers in copper — have the disease. Grindstone makers rarely live over twenty-four years, and the average life of the flint cutter and glass polisher is under thirty years, and that of the stone cutter thirty-six. A number of statistics were then given as to people breathing animal and vegetable dusts.

The problem of how to face this evil is simply how to environ each worker in the prosecution of his work with a pure atmosphere. The solution of the problem could be easily suggested by the sanitary engineer, but its execution is a matter for the legislatures of the several states. In the meantime it is extremely desirable that consumptive hospitals should be established in every city. London has its half dozen and other European cities are not without some provision, but in this country, even in many of the larger cities, there is no provision made for so necessary an object. It would be a great and truly useful work to devote an edifice in every large city to so benevolent a purpose.

AFTERNOON SESSION.

It was taken up with hearing the report by the committee on state boards of health. Dr. Granville P. Conn, of Concord, N. H., presented the report, which stated that Maine, Kansas, and Pennsylvania had completed the organization of their state boards of health since the last meeting. The report stated that a conference of boards, through a committee, had adopted recommendations looking to annual conference during the sessions of the American Public Health Association, and proposing that any conclusions of this conference that are of interest to the public shall be reported by the secretary to the association through the standing committee on state boards of health.

THE EVENING SESSION.

At the evening session Dr. E. M. Hartwell, of Johns Hopkins University, of Baltimore, read an interesting paper on "The German System of Physical Education." He sketched the development of turning in Germany, how physical training was obligatory, not only in the high schools, but in the lower or public schools, and was now obligatory in the schools for girls. The aim was not only to train the soldier, but to educate the pupil harmoniously. The school children were required to give two hours weekly to turning. They begin the exercise at the age of six and carry it on until they leave the schools to enter the university or the industrial schools. Pupils were excused from turning only on a certificate by a physician that it would be better for them not to engage in turning. There were in Berlin 68 gymnasiums maintained by the city, and seven or eight partly supported by the imperial government. In Frankfort-on-the-Main each of the thirty-one schools had its gymnasium. They were not so luxuriously fitted as gymnasiums in this country, but were admirably adapted to the purposes for which they were intended. In Frankfort two hours weekly were given in the schools to compulsory play. Besides this, teaching swimming was almost universal.

The movements for different ages were varied, but were all parts of a regularly organized system. The little ones begin with marching, running, jumping, skipping the rope, and then pass on to the use of the different apparatus,—the parallel bars, the horse, and many others that are not seen here. In the higher classes the boys were taught fencing. They were taught by regularly trained teachers, not mere gymnasts, who received a normal training just as other teachers did. In these normal schools officers of the German army went through the course of gymnastics so that they could teach the soldiers. They could see in Germany a squad of men with knapsacks scale a brick wall twenty feet high without a ladder, or go over a picket fence fifteen feet high without catching their clothing. Then they were taught also to go over ditches and stockades, and received special instruction in fencing and saber exercises.

Dr. Hartwell gave an interesting account of the great turner tests. He thought the German system practical and well-devised, and that it had produced great results. He thought it contained very many lessons which it behooved Americans to study.

REMARKS BY GOVERNOR GRAY.

Governor Gray, of Indiana, who had just arrived in the hall, was introduced, and made a brief address, commending the work of the association. He said it was a notorious fact that the American people paid less attention to their health than any other people in the world. They were a rapidly growing people, and had not time to look after their health; they would not have time to die if Providence had not ordained that they should die, without regard to the business on hand. If the ladies and gentlemen here would use their influence to carry into effect the teachings of the association, they would do more for the country than all the politicians put together. It was not worth while to cram the mind if there was not a good constitution behind it. A good digestion moved a person on more rapidly than any advice any one could give him.

Dr. O. W. Wight, health officer of Detroit, read a paper on "Experiences in Disinfecting Sewers." He gave an amusing account of the wretched sewer system of Detroit, and detailed successful experiments he had made, disinfecting them by burning sulphur in pails suspended in manholes.

The last paper of the evening was one by Dr. Benjamin Lee, of Philadelphia, on "The Debit and Credit Account of the Plymouth Epidemic."

THURSDAY.—MORNING SESSION.

When the American Public Health Association reassembled at Willard Hall this morning, a series of resolutions from the Philadelphia Board of Health was read. These resolutions declared that no rags from foreign ports shall be permitted to land at the port of Philadelphia until they shall have been disinfected, and urged upon the A. P. H. A. the necessity of passing judgment upon the matter of the importation of rags, and requested the association to recommend the thorough disinfection of imported rags in every part of the United States before they are distributed for manufacturing purposes. The resolution was referred to a special committee for consideration and recommendation.

MANUFACTORIES AND WORKSHOPS.

The executive committee presented a new draft of the resolution offered by Mr. Lomb yesterday, as follows:—

"That the A. P. H. A. respectfully recommends to the commissioner of statistics and labor the appointment of one or more commissioners or experts, whose duty it shall be to visit the principal factories and workshops in this country, to examine them carefully with reference to the provisions made in them to insure the health of the employés, and to report on the same with recommendations." This resolution was adopted.

AGAINST A NATIONAL SANITARY EXHIBITION.

The executive committee reported that in their judgment the proposition made in a resolution offered by Dr. Chancellor, secretary of the Maryland state board of health, to appoint a committee of nine to consider the practicability of holding a national sanitary exhibition in this city in 1887 was inexpedient.

Dr. John H. Rauch, secretary of the state board of health of Illinois, read a paper on "Maritime Quarantine from the Mouth of the St. Lawrence to the Rio Grande."

Dr. Rauch's paper contained a most exhaustive account of the quarantine precautions taken in every part of the Union, with strictures and suggestions. He was followed by Dr. Joseph Holt, president of the state board of health of Louisiana, with a paper on "Sanitary Protection of New Orleans, Municipal and Maritime."

YELLOW FEVER.

Dr. Holt offered a series of resolutions, which was referred to the executive committee, asking Congress to provide for the appointment of a commission of three members, one of known ability and special attainment in biological research, and particularly in the department of microscopic investigation, the other two medical men of recognized ability and experience, to visit Rio Janerio, Mexico, and, if necessary, Panama, Colon, and Havana, to investigate the methods pursued in those places to protect the unacclimated against yellow fever infection. The resolutions proposed that $30,000 be appropriated to pay the salaries and expenses of the commission, and that each member of the commission should receive as a recompense $5,000.

The last paper of the morning was on "Maritime Sanitation," and was read by Dr. S. T. Armstrong, of the Marine Hospital Service. The association adjourned a little after one o'clock.

RECEIVED BY THE PRESIDENT.

At three o'clock in the afternoon, by appointment of the President, the members of the association called in a body at the White House, and were received by the President.

EVENING SESSION.—THE LOMB PRIZES AWARDED.

The first regular business of the evening was the reading of the reports of committees of award of the Lomb prize essays. These prizes, offered by Henry Lomb, of Rochester, were in cash, aggregating $2,800, awarded as first and second prizes on the four subjects named. The first subject was "Healthy Homes and Food for the Working Classes." Dr. Chancellor presented the report of the committee, stating that the committee did not find that any of the thirty-six essays fulfilled the terms of the announcement, and therefore did not award the first prize. The second prize was awarded to an essay which, upon investigating the envelope containing the name, proved to have been written by Victor C. Vaughan, of Ann Arbor, Michigan. Hon. Erastus Brooks read the report of the committee on the subject "The Sanitary Conditions and Necessities of Schoolhouses and School Life." Of the twenty papers submitted the committee found none worthy of the first prize. The second prize was awarded to D. F. Lincoln, M. D., of Boston. Dr. Durgin presented the report of the committee on Disinfection and Individual Prophylaxis against Infectious Diseases. The first prize was awarded to Dr. Geo. M. Sternberg, of Johns Hopkins University, of Baltimore. The second prize was withheld. The fourth subject for which prizes were offered was "The Preventable Causes of Disease, Injury, and Death in American manufactories and workshops, and the best Means and Appliances for preventing and avoiding them." In this case the committee, which presented its report through Dr. E. M. Hunt, thought no essay submitted worthy of the first prize. They awarded the second prize to the essay of Geo. H. Ireland, of Springfield, Mass.

MR. LOMB MADE A LIFE MEMBER.

Mr. Lomb, the donor of the prizes, who was on the platform, was introduced to the audience and greeted with applause. Upon motion of Dr. Billings he was elected to life-membership in the association, the first to receive such distinction. The president announced that the money unexpended would be offered again in prizes to be awarded at the next annual session.

SCHOOL HYGIENE.

Prof. D. A. Sargent, of Harvard University, Cambridge, Mass., presented the report of the committee on school hygiene. The report gave an account of the reports collected by the committee of matters relating to school architecture and school ventilation. The committee suggested that as it would have to obtain its data largely by personal observation, its membership should be increased. A resolution that the association should resume the practical teaching of hygiene in schools, and that the committee be given power to increase its own membership at will, was referred to the executive committee.

THE DISPOSAL OF THE DEAD.

Dr. John Morris, of Baltimore, then presented the report of the committee on disposal of the dead. This subject has attracted much attention and been thoroughly discussed. No doubt the general acceptance of the germ theory and the surprising discoveries of Darwin and Pasteur concerning the life and office of ground-worms, have materially influenced public thought in this matter. Even those who do not favor cremation admit the necessity of reform in the present mode of burial.

AN ARGUMENT FOR CREMATION.

After reviewing in an exhaustive manner the testimony of medical experts, and setting forth the manner and grave objections to the present mode of burial, Dr. Morris said: —

> "If incineration were accepted, all these evils would be arrested. It is generally admitted that this process should be adopted in all great epidemics and after battles, but it would be wise to extend it to cases of zymotic diseases, such as cholera, small-pox, scarlet fever, and diphtheria. These poisons are preserved for years, and at certain times, under certain conditions, vent their destructive force on the human race."

TYPHOID FEVER NEAR A CEMETERY.

Dr. Kedzie, of Lansing, Mich., in discussing the report, referred to a terrible outbreak of typhoid fever in the city of Grand Rapids, Mich., which was traced to an alley located on low ground near a cemetery, where the wells, he believed, were contaminated by seepage from the burying ground.

Dr. Rohé said he had not yet had evidence presented to him that convinced him that any case of infectious disease had ever been transmitted by decomposing remains in a cemetery.

WHAT DR. MORRIS RECOMMENDS.

Dr. Horsch asked Dr. Morris whether he was in favor of cremation.

Dr. Morris, who had not been able to read all his report, owing to the expiration of his time, said he recommended incineration in cases of epidemics and battles. He confined his recommendation to that, as he thought as a representative of a public body he should be conservative.

Health Officer Raymond, of Brooklyn, asked whether, in the case of a great number of deaths in an epidemic, provision could be made for the rapid cremation of bodies.

Dr. Morris thought that such provision could and would be made.

Dr. Felix Formento, of New Orleans, declared himself in favor of cremation, and desired the association to adopt a resolution favoring cremation, especially in cases of epidemics of contagious or infectious diseases.

THE DETECTION OF CRIME.

Dr. Allen, of Massachusetts, thought the only valid argument made against cremation was the fact that it might in some cases prevent the detection of crime. The Massachusetts legislature, in passing a law authorizing cremation societies, had provided against destroying evidences of crime by requiring that a certificate from the official medical examiners be required in every case before bodies could be cremated.

Dr. Taylor, of the agricultural department, referring to chemical analyses made of well water, said the chemist would never detect the germ, and suggested that such investigations should be continued with the microscope.

WHY DR. HIBBERD FAVORS CREMATION.

Dr. Hibberd, of Indiana, said that he was in favor of cremation, but was with Dr. Rohé in believing that no evidence had been adduced that infectious diseases had ever been transmitted by cemeteries, etc. He was in favor of cremation because it was a good way of disposing, neatly and with dispatch, of bodies which were of no more use in this world, so far as he knew. He said that the excrementitious matter of a man weighing one hundred and fifty pounds would in a year amount to twelve times that weight, and that the greater danger was there. He thought he could safely drink water within two rods of any cemetery in Indiana, whether they could in Michigan or not.

SESSION ON FRIDAY.—COMMITTEES.

The closing session of the American Public Health Association was held to-day.

The committee on disinfection of rags appointed yesterday was increased by Drs. J. H. Raymond, of Brooklyn, and Joseph Holt, of New Orleans.

The subject of the disinfection of sewers was referred to the committee on disinfectants, which was continued another year.

A committee consisting of Dr. Thomas F. Wood, of North Carolina, Dr. S. W. Abbott, of Massachusetts, and Dr. Smith Townshend, of Washington, D. C., was appointed to report next year on the subject of vaccination and vaccine virus.

A recommendation of the executive committee that the conference of state boards of health be invited to become a section of the association was adopted.

THE CONSTITUTION WAS AMENDED

so that the executive committee shall consist of six active members, three to be elected each year by ballot, and to be ineligible to membership on that committee again.

The resolution offered by Dr. Hunt last evening in relation to school hygiene was adopted.

The president announced that Mr. Lomb had decided to offer four addional prizes of $100, $75, $50, and $25 for the best plans for houses to cost $600, $1,000, and $1,500.

It was decided to appoint a committee of three, with Dr. John S. Billings as chairman, to prepare uniform yearly, monthly, and weekly mortality report blanks.

WHAT CONGRESS WILL BE ASKED TO DO.

The advisory council recommended that Congress be urged to appropriate the necessary funds to equip the war and navy departments, so that the medical corps could prosecute researches into the cause of infectious diseases. The council also indorsed Dr. Holt's recommendation that a commission be appointed to investigate yellow fever in its breeding places.

DISINFECTION OF RAGS.

Dr. J. Howard Taylor, of Baltimore, from the special committee on disinfection of rags, reported that it is an admitted fact that the importation of rags is a prolific cause of the spread of infectious diseases, and that ports of entry are the gateways for their introduction; that foreign disinfection was not to be relied upon, and that a resolution should be passed by the association that all health authorities having jurisdiction over matters connected with maritime sanitation owe it as a duty to adopt uniform systems of disinfection, and thoroughly destroy all germs before the rags are permitted to be distributed for manufacturing purposes. After a long discussion the report was recommitted for further investigation by the committee during the coming year.

The advisory council, through Dr. Rohé, reported that Toronto, Canada, had been selected for the place of the next annual meeting, the date of which will be fixed by the executive committee.

OFFICERS OF THE ASSOCIATION.

The council also nominated the following as the officers of the association for the ensuing year: President, Dr. Henry P. Walcott, of Cambridge, Mass.; first vice-president, Dr. C. W. Covernton, of Canada; second vice-president, Dr. G. B. Thornton, of Memphis, Tenn.; treasurer, Dr. J. Berrien Lindsley, of Nashville, Tenn.; executive committee, Dr. Pinckney Thompson, Kentucky; Dr. Henry B. Baker, Lansing, Mich.; Dr. Joseph Holt, New Orleans; Dr. Charles Smart, U. S. A.; Dr. C. N. Hewitt, Minnesota; Dr. H. A. Johnson, of Chicago. These officers were elected by acclamation, and the new president made a brief address of thanks.

The secretary, Dr. Irving A. Watson, of New Hampshire, holds over, having been elected two years ago for three years. The new executive comprises in addition to the gentlemen elected to-day, under the rules of the association, the present officers and the ex-presidents. The ex-presidents are Dr. Toner, of Washington, D. C.; Dr. Rauch, of Illinois; Dr. Kedzie, of Michigan; Dr. J. S. Billings, U. S. A.; Dr. Hunt, of New Jersey; Dr. Albert L. Gihon, U. S. A.; and Dr. Reeves, of West Virginia.

THE LAST BUSINESS BEFORE THE ASSOCIATION.

Dr. C. A. Lindsley, secretary of the state board of health of Connecticut, read a paper giving an account of the typhoid fever epidemic at Madison, Conn.

Representative John Swinburne, of New York, a newly elected member, was introduced to the association and made a short address commending the work of the association.

Dr. Thomas F. Wood, secretary of the state board of health of North Carolina, read a paper on "Observation on the Cape Fear River Water as a Source of Water Supply."

A paper by George N. Bell, C. E., of Newport, R. I., on "Hygiene of the Dwelling," was read.

Capt. Henry Lomb, of Rochester, made a brief speech, thanking the association for the good will they had shown him and for the honor which had been conferred upon him by election to life membership.

Dr. J. M. Partridge, of Indiana, read a paper on "Cattle Diseases," and a paper by R. B. S. Hargis, of Pensacola, Fla., on "Modified Inoculation an Important Auxiliary in Preventing the Spread of Small-Pox," was read by title.

Dr. P. H. Bryce, of Toronto, was appointed chairman of the local committee of arrangements for next year.

After passing the usual votes of thanks, the association adjourned a little after noon *sine die.*

The executive committee, at a meeting this afternoon, fixed upon the first Tuesday in October next as the date of the next annual meeting, to be held in Toronto.

CONFERENCE OF STATE BOARDS OF HEALTH.

A report of the work of the American Public Health Association would not be complete without a notice of the Conference of State Boards of Health, which is destined to become a section of the association and is composed of delegates from all the state boards of health in the country.

These delegates represent a class of practical sanitarians and meet annually (oftener if necessary) to discuss questions affecting the public health in the several sections of the Union; being thoroughly in earnest in their desire to serve the people and to promote the prosperity of the whole country by preventing the introduction of infectious and contagious diseases, the presence of which in one section or state, not only will paralyze the business of that particular section, but it also will produce a panic for a great distance, and divert trade and commerce into other channels.

One great object of the conference is to obtain unity of action between state and local boards of health, in order to reduce to the minimum the friction between necessary health work and the commercial and business interests of the world.

Commercial and business interests are sensitive and desirous of being left to follow out their own plans; therefore circumstances often arise when it becomes necessary, for the public health, that Mammon and Hygiea shall hold a conference, for without sanitation, capital will prove a failure; but combine the two forces and properly direct the combination, and an irresistible power will be developed and brought to the front that will make itself felt to the remotest part of the world.

Yellow fever in New Orleans and the Mississippi valley, small-pox in Quebec and Montreal, menacing New England and the Northwest, cholera in New York threatening the whole Atlantic coast, diphtheria at Bar Harbor, or typhoid fever at Saratoga, scattering the summer visitors in a single day, will render an immense amount of capital for months without a dividend, while the loss of thousands of lives represent to the sanitarian a total loss of thousands of dollars, and to the philanthropist and humanitarian an untold amount of poverty, suffering, and woe; for with the losses sustained in non-dividend paying investments, and the diversion of trade and commerce into other channels by reason of the fear of epidemic and contagious disease, comes the loss of work to the laboring man, while laborer and capitalist are equally exposed to the epidemic influences, and the angel of death has no respect for personal distinctions or state lines. Traffic and travel must succumb to its influence, while none are left to contend against its onward march but the sanitarian and philanthropist, who, refusing to flee from the field, will continue to contest its approach until, as in 1878, hundreds become victims of an invisible foe. At the last conference, among other topics discussed was that of quarantine, and abstracts of the reports by Dr. Rauch, of Illinois, and Dr. Holt, of Louisiana, are herewith appended.

Dr. John H. Rauch, secretary of the state board of health of Illinois, read a paper on "Maritime Quarantine from the Mouth of the St. Lawrence to the Rio Grande." It was a very valuable paper, describing in detail the means taken at every seaport along the coast to the Gulf to prevent the introduction of disease into the country. He described the wonderful improvements that have been made in the sanitation of ports. In reference to the ports of Virginia, Dr. Rauch said that Dr. James D. Galt, the quarantine medical officer of the Elizabeth river district, writes him from Norfolk that the quarantine station at that port is abreast of Craney Island, five miles below the city, where the river rapidly widens into Hampton Roads. Vessels are invariably examined at the station, and all absolutely prohibited from coming up until inspected by the quarantine officers. When in quarantine, vessels are anchored at a safe distance outside the main ship channel. So far, there have been no cholera-infected vessels to inspect. The inspection maintained by the national government through the Marine Hospital and Revenue Marine Services is an additional protection to the city, but it is maintained only during the warmer months of the year.

The speaker also in referring to the ports of Maryland said, that he had, on the 4th of August, accompanied by Dr. James A. Stewart, health commissioner, made an inspection of the quarantine establishment of the port of Baltimore. This is situated at Little Hawkings or Leading Point, about seven miles from the city, on the Patapsco river. The grounds belonging to the station embrace about twenty-five acres, surrounded by improved farms. There is a new and well-arranged hospital building, with accommodations for forty patients; also a residence for the physician in charge, boatmen's houses, stables, etc., all in good condition and neatly kept. The station is connected by telephone with the city. There is no provision for the care of those detained for observation after exposure upon an infected vessel. The hospital facilities may be increased by the use of tents in suitable weather, and in case of emergency the old quarantine establishment, now used as a small-pox hospital, might be utilized. The quarantine season extends from May 1 to October 31, and during this period an assistant resident physician is on duty at the station. All foreign vessels bringing passengers are required to stop for examination throughout the year. Vessels are boarded in the harbor from a steam tug kept in constant readiness for that purpose. The depth of water at the quarantine anchorage is about twenty-two feet at low tide, and there is plenty of room to anchor vessels out of the track of commerce. There are no facilities as yet provided for the discharge and disinfection of cargo from an infected vessel, but additional facilities and proper appliances for disinfection are contemplated. As a further precaution in the present emergency, the doctor suggested the advisability of requiring vessels to submit to inspection by the government service at Cape Charles.

Quarantine along the Delaware coast is limited to the local regulations of the coasting trade. There is a government quarantine station at the Delaware breakwater, fully described in connection with the Pennsylvania quarantine system.

SANITARY PROTECTION OF NEW ORLEANS.

Dr. Joseph Holt, president of the state board of health of Louisiana, next spoke upon the sanitary protection of New Orleans, municipal and maritime. His paper was an eloquent one, describing the means which had not yet been taken by New Orleans for the sanitation of the city, but toward which he said the people were being educated by the health board and by the intelligent public press. Already a plan was being prepared for the systematic and thorough sewerage of the city. Maritime sanitation had taken the place of quarantine along the coast. The theory of bacillic origination for the essential cause of diphtheria, consumption, small-pox, and yellow fever has passed from the realm of uncertainty into a crystallized fact. Even in our religion, incantations and long-drawn prayers are no longer looked upon as disinfectants. We have tried these and have invariably been swamped. We are no longer fighting the devil and the devil's works, but a microscopic germ, a little leaven, which, if not speedily eradicated, leaveneth the whole lump. Yellow fever and cholera are due to living organisms, and it is to the destruction of these that our efforts are directed. The surest prevention of a conflagration is to quench the first spark. The surest prevention of an epidemic is to act on the first suspicion of the presence of epidemic disease. We disinfect every ship coming from cholera or yellow fever regions, regardless of bills of health or the angry cry of trade-mongers. Should you ask why does not the commerce of New Orleans sweep the circuit of the world? Why it has not grown as other large American cities? I would answer in one compound word, yellow-fever, "the yellow poison oozing from the pinion tips of the Angel of Death."

INOCULATION FOR YELLOW FEVER.

Dr. Holt spoke at length upon the success of inoculation for yellow fever. It has been proved that the germ can be inoculated in the body of the unacclimated person, and that a mild form of yellow fever will be produced thereby. The persons who have been thus inoculated have been enabled to pass through most virulent epidemics unscathed. In concluding his paper, Dr. Holt said that the principal object of his visit to Washington was to present the following resolutions to the association to bring to the attention of Congress:—

Resolved, That the question of immunity from yellow fever is so intimately connected with the social, industrial, and commercial growth of Tennessee, the Southern Atlantic, and the Gulf states of the Union, as to determine the destiny of Memphis, Charleston, Savannah, Pensacola, Mobile, New Orleans, and Galveston, and

Whereas, A large accumulating mass of testimony that the power of protecting the unacclimated against yellow fever has been discovered and proven in the inoculation of the essential germ or cause of the disease by methods distinctly formulated and available, these aforesaid declarations and numerous instances cited in corroboration, emanating from medical scientists at the head of the biological departments in the highest institutions of learning in Mexico and Brazil, authorized by and bearing the indorsement of their respective governments;

Resolved, That we, the representatives of the boards of health in the several states of this Union, and we, the officers and members of the American Public Health Association, regarding the question as pre-eminently a vital issue, as one in its assumptions true or false, and, if true, of incalculable worth, surpassing the computation of many millions of dollars, and the saving of tens of thousands of lives of its own people, that we hereby petition and urge upon both branches of Congress, now assembled, to appoint a commission for the purpose of making a complete investigation of, and reporting, after a thorough examination of the methods pursued, their effectiveness in protecting the unacclimated against the yellow fever infection, together with all associated observations and experiments that may be ascertained.

Resolved, That in the aforesaid petition the commission shall be stated to consist of three persons, one of whom shall be of known ability and special attainment in biological research, particularly in the department of microscopic investigation and culture of the essential germ as causative of the infectious and contagious diseases. The other two members of the commission shall be medical men of recognized ability, based upon long and ample experience, competent to give expert consideration to all phases of the symptoms and course of yellow fever in any form, wherein the phenomena of the disease may present itself, whether induced in the course of pestilential invasion, or in purposely devised inoculation.

Resolved, That this commission aforesaid shall proceed at the earliest possible moment to Rio de Janeiro as the first field of its labors. Having completed there its work, it shall proceed to Mexico and, if necessary in the accumulation of testimony, to Panama, Colon, and Havana.

Resolved, That the sum of $30,000, or so much thereof as may be actually required to pay the necessary and unavoidable traveling and other expenses and the salaries of members of the commission.

Resolved, That the sum of $5,000 shall be paid as a recompense to each member of the aforesaid commission.

DISPOSAL OF GARBAGE.*

BY G. P. CONN, M. D., PRESIDENT OF STATE BOARD OF HEALTH, CONCORD, N. H.

During the summer months New Hampshire is favored with the presence of a great number of visitors, who find a congenial though but a transient abiding place among our lofty hills and pleasant valleys. These people come into the state in search of health or pleasure, and to secure either it is necessary to have pure air, pure water, and an uncontaminated soil. The geographical and topographical conditions of the state render all this, not only possible, but natural factors of our commonwealth. Nature not only designed New Hampshire "to be a good place to emigrate from," but she also gave us such natural hygienic conditions that those desiring to remain in the state may enjoy life without malarial influences assailing their health, or epidemic diseases interfering with business or pleasure. Any infringement upon these conditions must come from human interference, and the intelligence of our people will not allow the places of public resort in our state to become polluted and rendered unhealthy by reason of the ignorance of the laws of health, or the avarice of a few disinterested people who may desire only a present return regardless of future prosperity.

Comparatively speaking, New Hampshire has but a small area of undrained swamps, and the soil in every part of the state is prolific in vegetable growth. Were it not for this fact, the cutting off of our wood and timber lands would prove a serious matter, inasmuch as it detracts so much from our scenery to remove our forests; but in reality it requires but a very short period for nature to repair damages to that extent that our rough and rocky hillsides become smoothed over with living green, pleasing the eye and adding an exhilarating and invigorating element to the atmosphere that is fascinating to the overworked resident of the crowded centers of population.

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* Read at the April meeting of the board.

This last feature has very much to do with securing natural sanitary conditions, for much that is considered waste and effete matter is, by the metamorphosis of vegetable life, transformed into the beautiful. Thus what would otherwise become a serious nuisance is made, in nature's laboratory,to become a living thing and subserve the interests of man.

In a business way the people of New Hampshire have profited by these natural conditions. Railroads have been constructed for the sole purpose of providing transportation for those coming into the state during the summer. Large hotels and boarding-houses have been erected solely for the comfort and accommodation of these transient guests.

In some portions of the state many an old farmhouse and cottage has been improved and enhanced in value, thereby increasing the revenue of the state. These dwellings furnish comfortable houses for those desiring a quiet retreat, and have a thrifty, well-to-do appearance in comparison with the abandoned farmhouses, and farms turned into pastures in towns where nothing is done to make them attractive for summer visitors.

The large amount of capital invested and the great number of people who find employment in this class of business render it important to the state that nothing shall interfere with its natural progress and development. Hygienic conditions must prevail, else epidemic or endemic disease will find a foot-hold; and a single case of diphtheria or scarlet fever will clear a hotel of its guests almost as quickly as would an alarm of fire.

Large hotels have oftentimes found it difficult to dispose of the waste material coming from the table. Ordinary sewage can be taken care of much more easily, as it will by its own gravity find a lower level, and, therefore, can be conducted in pipes beyond the danger of becoming a nuisance, providing ordinary intelligence is exercised in the selection of a site, and first-class work is secured.

It has been the custom of many of our summer hotels to rely upon a herd of swine to take care of the garbage coming from the table; but the capacity of the hog, like that of man, is limited, and great numbers are necessary to take care of the immense amount that is daily accumulating.

Practically it has been found impossible to bring large herds of hogs together in a limited space, and feed them on this kind of material, without causing an epidemic like cholera. It has for a long time been a settled fact that neither men nor animals can be massed together in limited inclosures without developing epidemic or endemic disease. Now in order to keep swine upon such food as that which we are discussing, it becomes necessary to confine them in a limited space. At some of the hotels in the northern part of the state, after the swine became affected, they were turned out into open lots and the disease abated; but they would not consume the garbage from the table. Some of our western friends have advanced the opinion that these large quantities of table refuse soon become changed, in fact, that decomposition is an early factor, and the animals fed with such partially decomposed food must of necessity become diseased.

Of course partially decomposed food is not desirable for any class of animals, and it is found that in this kind of food it is literally garbage, for the reason that so much extraneous matter becomes incorporated with it, as it is considered a measure of economy to send away with this material any and all waste from the hotel.

When the animals become diseased and are turned loose, then nothing is left except to cart this garbage away and bury it out of sight. Thus it becomes a serious question, for it must be disposed of, and when buried in the ground it is but slowly changed; and all the while, unless a great deal of time is spent in burying it very deep, it will give off very offensive gases, which guests are apt to vote a nuisance, and, therefore, they will go somewhere else.

It has seemed to me for some time that in large hotels, or where several small ones are near together, or where several boarding-houses are restricted in the space necessary to take care of such refuse, as well as at camp-grounds and places of public resort, it would be necessary to adopt some radical change in caring for this kind of garbage. I have had it in mind that the only safe and efficient manner of disposing of garbage was by fire, and have watched with much interest for some form of a furnace that would cheaply and efficiently do the work. Recently I saw in the *Sanitary Engineer* a description of a furnace designed and erected by Capt. H. I. Railly, for the use of the United States troops stationed on Governor's Island, in New York Harbor. I will give the description in his own language: "I inclose a sketch, to scale, of the garbage furnace which is in use here, as it may interest your readers. The garbage, varying in daily quantity from ten to thirty cubic feet, used to be buried, but the small extent of ground available for the purpose became so saturated that, in summer time especially, the odor was distinctly perceptible and not agreeable. For this reason it was finally decided to burn the garbage, and I made many unsuccessful attempts to get some information as to the proper construction of a furnace for the purpose. I finally applied to you, and it was on information derived from your valuable paper that the furnace now in successful operation was built. An experimental one, which gave excellent results, was first tried by obtaining an old brick oven, so as to get something similar to "Fryer's Destructor," which was described in your paper.

"The one now in use consists essentially of a chamber 4′ by 5′ by 3′, lined with fire-bricks and divided into three spaces by two gratings, composed of round iron bars (3-4 inch) with inch openings between the bars, as well as the necessary doors, grate-bars for the fire-box, which has a surface of six square feet, and an ash-pit. The gratings are for the purpose of supporting the garbage so the heat can get through and dry it, and to prevent it from stopping the draught or putting out the fire.

"Its operation was commenced by making a coal fire and putting the garbage in on the right side to dry; the next day's garbage was put in the chamber on the left side, and the dry garbage was then raked over the fire. By placing the garbage in the right and left chambers alternately, dry garbage is supplied and the fire kept constantly burning.

"The chimney, owing to its location, had to be built fifty feet high, thereby increasing the expense of construction, although it was originally intended to have it only thirty feet, which would have given ample draught. The total cost was about $350. *No fuel of any kind other than the garbage is used or needed,* unless the fire is allowed to burn out, when, of course, some fuel is necessary to start the new fire. One man has charge, and after putting in the day's garbage, generally limits his attention to raking dry garbage over the fire at noon and again at sunset."

This appears to be a very simple, effectual, and comparatively inexpensive furnace for the complete destruction of garbage. The principle involved no more nor less than the recent modification of the magazine stove,—sometimes erroneously termed base-burner,—whereby the coal is placed in chambers opening through the side, instead of being filled into the center of the magazine through the top of the stove or furnace.

This modification became necessary to secure a constant supply of fuel to hot-air or steam-heaters, the height of which was such as to preclude filling the magazine from the top, and I cannot see why some form of a furnace, portable, and therefore kept in stock like the ordinary furnace or steam-heater, might not be constructed for $100 or less, that would be capable of the destruction of from three to ten cubic feet of garbage per diem. Whenever this can be done for an investment of one or two hundred dollars, it will not pay to make an investment of one thousand dollars in swine and run the risk of an epidemic of hog-cholera.

Whenever a furnace can be fitted up for a moderate amount, it can be made a paying investment for some enterprising Yankee to erect one at such places of summer resort as the Weirs, the Heading Camp-ground, or other similar places of temporary abode, charging a moderate fee for taking care of all the garbage from each house or hotel.

It would probably be far better for large hotels and railway restaurants to erect stationary furnaces, as the supply would be permanent.

UNSANITARY WELLS.*

BY WILLIAM CHILD, M. D., NEW HAMPTON, N. H.

To intimate that your neighbor's children are ugly, and to suggest that his well is not sanitary, are unpardonable offenses. This domestic sensitiveness is universal, and the more truthful the accusation the greater the offense.

An unsanitary water supply is a disgrace and a danger; a disgrace because preventable, a danger because it may produce sickness and death. Careful observers declare that the water from ninety-five in one hundred wells is unsanitary, and that its domestic use is detrimental, causing the slightest indisposition or the most malignant fever.

To demonstrate these statements is no part of this paper. Facts to prove them are recorded; others are constantly appearing. Only physicians and sanitarians can have personal and practical knowledge of these facts and their significance, yet they are relative facts of the most vital importance to the public, facts that must be repeated and emphasized.

The adjective terms used in this connection must be considered here. Bad, foul, pure, impure, contaminated, polluted, infected, unhealthy, and healthy are words used indiscriminately, and thus confuse the general reader, losing their significance and force. Literally there is no pure water; water may be impure and yet be sanitary, may be impure and not polluted, may be polluted and not contaminated, may be contaminated and not infected, may be infected and yet be as sparkling as a diamond and as clear as crystal, may be charged with the germs of most virulent disease, yet make no reply to the most delicate chemical tests.

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* Read, by invitation, at the April meeting of the board

The following terms, with their application, are suggested. Pure and impure should be abandoned. *Pure* is wrong, because there is no pure water upon the earth's surface. *Impure* misleads, because to the general reader it indicates unsanitary, whereas water may have impurities within certain limits and yet be sanitary.

Now, then, pure and impure in this connection should be abandoned. Then we have sanitary, unsanitary, polluted, contaminated, and infected water. The meaning and application of *sanitary* and *unsanitary* are apparent. *Polluted* indicates merely filthy water. This may be disagreeable to taste, sight, smell, and every sense of decency, yet may not be unsanitary. *Contaminated* indicates water so surcharged with animal and vegetable waste as to render its domestic use unsanitary. *Infected* water contains the germs of specific disease, and its domestic use will cause the same to be repeated. These terms thus applied have a manifest and precise meaning evident to the non-professional reader. Thus we may have sanitary, unsanitary, polluted, contaminated, and infected water. Each has a distinct character, and can be recognized by chemical tests or their effects upon men. Intelligent investigators, men who can have no possible interest in the matter, more or less, than the exact truth, declare that the water in nearly every common well is properly described by one or more of the above terms. Physicians and sanitarians accept this, and in some degree appreciate its importance, but the public seem indifferent and unbelieving. Many consider boards of health useless and sanitary expenditures wasteful, sanitary laws despotic and their execution aggression. Some consider the whole matter an amusing comedy, but suddenly they will find it a terrible tragedy. One Plymouth, Penn., epidemic in a century ought to arouse the indifferent and convince the doubting. Men seem to have a melancholy interest in disregarding all sanitary cautions; they adhere strangely to an unsanitary well. It brings to mind two boy brothers who had the itch. The mother discovered that they daily resorted to their chamber, and there stripped to the skin scratched each other with a stiff brush. The mother at once inaugurated a cure with the usual sulphurous unguent; but the boys objected, declaring they would not be deprived of the exquisite fun of being scratched when they itched. But where there can be pleasure in polluted water does not appear. How does well water become unsanitary? It is difficult to convince men that a well of considerable depth, on apparently high ground, with clean surface surroundings, with water clear, cool, and odorless, can possibly be unsanitary; but a little careful attention will show conclusively that it is so.

Some important facts must be noticed here. All food taken by men and animals is made up of the most highly organized albuminous and nitrogenous compounds. While these, in a sound condition, properly digested, and normally assimilated, are a perfect nutrition for men and animals, so, also, are they, when partially decayed or are undergoing putrefactive fermentation, and not disinfected by vegetation, oxygenation, the influences of wind, rain, and sun, capable of generating the most virulent poisons known to man. A few particles of a poison thus produced, injected into the veins of an animal, will cause death almost instantly.

Then, again, certain mineral and metallic poisons may be found in the water of our best wells, both from natural and artificial sources. Copper, arsenic, and lead may accumulate from unsuspected sources.

Also germs of disease thrown out from the sick-room upon the earth may and do find lodgment in the well's bottom, and thence find their way into the bodies of those drinking water therefrom, and reproduce the parent disease from which they originated. It is supposed that all infectious diseases may be reproduced in this manner. Beyond a doubt typhoid is often, generally, thus propagated.

Now, then, keeping in mind the above facts, let us examine one or a thousand of our grand old farm establishments of one hundred years' standing. Clustered on a few square rods of land, are the farm buildings, the dwelling, woodshed, wash-house, horse-stable, cow-barn, sheep-yard, swine-house, hen-house, corn-house, compost-heap, cesspool, and privy. All these are arranged in a hollow square, and in their midst is the farmer's well with its curb, sweep, and bucket, or its cover, pipe, and pump. Around this center are concentrated all the activities of life upon a New England farm. Birth, life, and death; bloom, fruit, and decay of men and animals, of shrubs and trees, have transpired here for a century. All the waste has been dropped upon the surface, there to accumulate, decay, putrefy.

Then, again, the bottom of the well, the very center of all these activities, must be at or below the level of the natural water basin of the immediate vicinity, and must rest upon or in clay, marl, or rock impervious to water. The well is excavated through sand, gravel, drift, or other earth pervious to water. All these conditions must exist or there can be no well.

Now let us picture the life upon these few square rods for one hundred years. In and about these buildings live three hundred creatures,—men, beasts, and birds. They are stabled here during winter and yarded here during summer; here they take their daily food and drink, and discharge their daily waste. During one hundred years there have been nearly eleven million days of animal existence, all within drainage and leaching distance of the source of the water supply of the whole establishment. The amount of waste that can not be removed by evaporation, drainage, or absorption is enormous. The fact must be apparent to the most skeptical, that the earth beneath farm buildings, stables, cesspools, and privy vaults, and about wells near the same, is surcharged with animal and vegetable waste. This point must be conceded by all. It needs but a moment's attention to convince the dullest mind that every establishment with only the usual sanitary precautions, is resting upon and above a mass of most dangerous filth, and that this filth is being daily leached into the bottom of the well.

Now we will leave it to the common sense of men to estimate the condition of such water. It is not a matter of guess-work, nor fancy; it is a fact that can not be disputed. There can be but one conclusion, viz., that the use of water from such a source must be repugnant to every sense of decency; must be detrimental to perfect health; must impair nerve force; must diminish vitality of body and activity of mind; must derange the circulation of the fluids; and all this must result in congestious inflammations and organic destruction. These are the conclusions that cannot be avoided. Beyond a doubt, unsanitary water is one important cause of the "chronic invalidism" in New England. Then, again, it needs but little argument to prove that the prolonged use of such water does produce actual disease,—active, acute disease. Perhaps this can not be mathematically demonstrated, yet circumstantial evidence is not wanting to prove it beyond a doubt. Our board of health reports are filled with cases confirming this opinion. There is a large class of diseased conditions best represented by diphtheria and erysipelas (which, in my opinion, are one and the same disease in all essential particulars). They are characterized by diffused inflammations, purulent formations, and finally septic poisoning. Unsanitary water is not the only, but one of the causes of these diseases. But all these causes operate upon precisely the same general principles, and physicians endeavor to cure them by exactly the same remedies. It is also held with good reason that scrofulous and tubercular diseases are originated, or certainly rendered more intense, or run their course more rapidly, from this cause. Then, again, the most important particular of this matter is the fact that the water of our wells may become infected with the germs of diseases, such as typhoid fever, diphtheria, anthrax, and perhaps some other diseases, and then, when used for drinking, will communicate the parent disease to those drinking the water. Thus these diseases may go on repeating themselves indefinitely. Typhoid fever is thus propagated beyond a doubt. The epidemic at Plymouth, Penn., is a most striking and indisputable instance. The same does occur repeatedly in New Hampshire year after year. No well-informed person will deny the possibility, nor the probability, nor even the common occurrence of such a communication of typhoid fever. Now, then, this fact being granted, we must admit that the possibilities of unsanitary wells are immense, and that there is no excuse for the ignorance, and no pardon for the crime, that permits the neglect of proper and sufficient sanitary measures to prevent the increase of such diseases.

During the last three years there have been in this state 497 deaths from typhoid fever, and 358 from diphtheria, making in all 855 deaths from preventable diseases. But more yet; if we estimate in the usual ratio, there have been in the same time not less than 10,000 cases of painful diseases that could have been prevented by means already within human knowledge.

The cost of these diseases in cash actually paid on account of physicians, nurses, and other help must be fully $50,000; and the loss by death would amount to nearly $1,000,000 for the three years. Probably there is a yearly loss to the state and to individuals of at least $50,000 per year on account of diseases that could be prevented by proper sanitary precautions, and a great part of this should apply to our water supply. This cost, according to excellent authorities, might be avoided to a degree. To accomplish this, demands the services of the keenest intellects, almost superhuman perseverance and energy, and perhaps most radical means and measures. But why not employ them? Had there been 8,550 cases of small-pox with 855 deaths during the last three years in the state, there would have been a vigilance committee in every county, a smoke-house in every village, and a line of soldiers extending from the Atlantic to the Pacific. Why not do as much for the arrest of diphtheria and typhoid fever? There are as many facts to justify such action in the one case as the other.

Now one line of such action is in the direction of our wells. When public opinion is more fully informed upon this matter all old wells near dwelling and out houses will be abandoned and no new ones dug, excepting in suitable and sanitary locations; and these must be protected by the most perfect sanitary precautions.

Another necessity is the chemical examination of every well in the state. There is as much reason for this as for posting sentinels on our borders to repel small-pox. Eight hundred preventable deaths and ten thousand preventable cases of disease demand this, or we must abandon our belief in the preventability of these diseases. Of course public opinion is not up to that point of action; yet it is time to advocate such action. This is correct if the prevailing idea of preventability of certain diseases is correct.

Finally, suppose we had no proof that any specific diseases were caused by the so-called unsanitary waters, there is sufficient reason for their being abandoned on account of their well-known condition and surroundings. When we remember that the body is only a mass of delicate cells, and that every function is but the growth, life, and destruction of these cells; and when we know that these cells are composed of the most delicate membrane, and that all life is but the passage of fluids in this membrane; and when we also know that all this is directed and controlled by a certain force called vitality, and more yet, that this very vital force depends upon proper cell action, and then when we comprehend that all this vital action could not go on for one moment only that water renders it a possibility,—then, I say, we can partially understand the absolute necessity of a water supply of a standard sanitary purity to a creature perfect in body and mind. It is perfectly certain that in the beginning God created water of this standard purity. If so, what must be the result when this fluid is allowed to fall below this standard purity? There can be but one general result, and that is confusion of mind and destruction of body. And who shall dare to say that the soul's salvation may not in some degree depend upon the sanitary purity of this all important fluid?

SCHOOLHOUSES OF MERRIMACK COUNTY.*

BY IRVING A. WATSON, M. D., SECRETARY STATE BOARD OF HEALTH.

About one year ago the State Board of Health decided to investigate the sanitary conditions and surroundings of the schoolhouses of the state. In order to carry out this idea in the most practical way and to obtain the most reliable information at the least expense, a blank-book containing numerous questions bearing upon the subject was prepared. It was deemed best to carry out the work through the assistance of the teachers, as far as possible, chiefly because they, being in daily association with all the conditions, would have a superior knowledge of the situation, and could give an accurate report without feeling the weight of responsibility that would naturally rest upon a member of the school board or upon the prudential committee. The questions were prepared with great care, and whenever necessary to an exact understanding explanatory notes accompanied them.

The blanks contained fifty questions, besides a page printed in small squares for the purpose of rendering it easy to draw a good plan of the buildings upon such a scale as the teacher might choose, and without rule or measurements. An illustration of how the plan was to be drawn accompanied the page mentioned. The only questions requiring any labor on the part of the teacher beyond the ordinary answer, were those asking the length, breadth, and height of the schoolroom, size of glass, etc.

The work was commenced by sending a letter to all the superintending school committees in the state, asking them to forward to

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*** Read at the April meeting of the board.**

the board, upon properly printed postal cards sent with the letters, the names of all the persons teaching in their respective towns, with number of district, post-office address, etc. Upon receipt of the names a copy of the blank-book above described was sent to each teacher, with a letter asking each to interest himself and to assist in the important work which the State Board of Health had inaugurated. The promptness, willingness, and courtesy with which the teachers responded cannot be too highly commended. Indeed, not a few expressed in strong terms their high appreciation of the importance of the work. In many towns the superintending school committees did a great deal toward completing the survey within their respective jurisdictions. It is to be said, with regret, that in a few instances no interest has been manifested in the attempt to improve the condition of either the schools or the houses. Happily such evident lack of interest has been the exception.

Reports have been received from about two thirds of the schoolhouses in the state, and it will probably take another year to complete the survey. From the reports already received, some fifteen hundred, we are able to gain a very general knowledge of the schoolhouses throughout the state. Not a few districts have houses unused for want of pupils; these houses are not included in the survey, for the reason just mentioned.

The work of examining and transferring these reports to blanks, that will show at a glance the sanitary conditions and situation, is so great that at this time only a small part of it has been completed. That some general knowledge of the existing state of our schoolhouses and their condition may be comprehended, we have taken all the schools of Merrimack county that have been reported up to the present time, *one hundred and seventy-six.* These reports, we are confident, will represent a fair average for other counties. The first and most important subject is that of

VENTILATION.

In the construction of a very large majority of our schoolhouses this vital consideration has been entirely ignored, in others a feeble attempt at ventilation has been made, but generally without any knowledge of the natural laws involved in the problem, hence, with but few exceptions, the efforts have been of little or no value. A register placed in the ceiling and opening into a closed attic is of little more account than a gimlet hole through the wall. Most of our schoolrooms are little better than close pens; but the results of non-ventilation are not so apparent as to attract the attention of every community, for the following reasons:—

1. The longest period of constant confinement is, as a rule, not over an hour and a half. The room is to a large degree ventilated at morning, noon, and at close of school hours, besides the air is at least partially changed during recess at the middle of the morning and afternoon sessions.

2. Many of the schoolhouses are in so dilapidated a condition that they are self-ventilating. In answer to the question "Is the house well ventilated, and how?" replies on file state that the great problem is how to keep the air out, since clapboards and plastering are evidently regarded in that district as needless and expensive luxuries. "Cracks in the wall" is not an uncommon answer to this question.

3. Many of the schools contain only a few scholars, and this is, of course, an advantage so far as the necessary amount of pure air is concerned, because the smaller the number in a given room the greater the cubic space per scholar, and the longer the air will remain suitable for respiration.

To better understand the deficiencies in ventilation it should be kept in mind that, although authorities differ somewhat, it is generally conceded that among school children at least eighteen hundred cubic feet of fresh air per hour are required for each scholar. Several good authorities place the amount at a much larger figure. Thirty cubic feet of air per minute are necessary in order that the carbonic acid exhaled from the lungs of the pupil shall be kept within the limit of six parts to ten thousand of air, above which point it is not suitable for respiration.

Making our computations upon this basis, we find that of the number reported, without any means of ventilation, the average attendance would render the air unfit to breathe, as follows:—

Two schools	in four minutes.
Two schools	in five minutes.
Six schools	in six minutes.
Seven schools	in seven minutes.
Eight schools	in eight minutes.
Sixteen schools	in nine minutes.
Ten schools	in ten minutes.
Fourteen schools	in eleven minutes.
Six schools	in twelve minutes.
Nine schools	in thirteen minutes.
Fourteen schools	in fourteen minutes.
Eight schools	in fifteen minutes.
Seven schools	in sixteen minutes.
Eleven schools	in seventeen minutes.
Seven schools	in eighteen minutes.
Four schools	in nineteen minutes.
Five schools	in twenty minutes.
Thirty schools	in twenty to thirty minutes.
Five schools	in forty-five minutes.
Two schools	in one hour.
Two schools	in one hour and a half.

The time above given is somewhat longer than the actual time would be, because the teacher is not included in the number occupying the room, and all fractions are credited in favor of the schoolhouse. For instance, if the exact time was three minutes and ten seconds, it was put in the list as four minutes. Of the one hundred and seventy-six houses mentioned the teachers report seventy-seven as having no means for ventilation, while in ninety-nine some attempt has been made to secure more or less circulation of air. It is exceedingly doubtful if efficient means have been secured in half a dozen houses. The answer "Register in ceiling" generally means that it opens into a close attic and simply affords an outlet for the heat when it is often most needed in the room. The oft-repeated answer, "A register overhead, but no provision for admitting fresh air," shows how little the principles of natural philosophy have been understood by the builders. We can safely say that of the ninety-nine houses which have a so-called ventilating register or flue, the majority are no better ventilated than the seventy-seven houses which have no registers or air flues. Supposing the doors and windows to be close fitting, the air in one hundred and thirty-seven out of the one hundred and seventy-six rooms reported would become polluted in from four to twenty minutes to an extent that would jeopardize the health of the pupils. The only protection, then, from the severe consequences that would naturally follow from this condition, is the occasional opening of a door or the raising of a window when the weather will permit, and the fire in the stove, which in maintaining combustion makes a forced demand upon every crack and crevice to admit fresh air from without. Indeed, the "economy" of the district which has given to the little ones a schoolhouse half made, with but one sanitary fixture, cracks, through which fresh air can reach the lungs and aerate the blood of the shivering pupils, is often their physical salvation.

In the summer months open windows and doors are sufficient for ventilators; but during the winter season they cannot be used to any extent for this purpose, and the pupil must suffer in some degree from an insufficient amount of fresh air. The injurious effects of confining children day after day in these unhealthy rooms may not be apparent at the time; but no one believes that poisoned air can be inhaled daily for any considerable period, especially by children, without entailing more or less disastrous consequences. Acute disease does not always attend, but headaches, indigestion, loss of appetite, nervousness, impaired constitutions, puny bodies, and weakened intellects are results of this too often unrecognized cause.

LIGHT.

Good authorities state that the total area of glass for lighting purposes should not be less than twenty-five per cent of the floor area of the room. In localities where the light is obstructed, as in the compact parts of a town or city, a much larger per cent is often necessary. The windows should be provided with curtains or blinds, better both, so that a uniform degree of light may be maintained. The minimum amount of lighting area should be sufficient to give a good light upon a cloudy day, and curtains or blinds used to prevent too great an amount at other times, and to exclude the sun when necessary.

We find that in the schoolhouses under consideration the window area falls, on an average, very much below the requisites stated above; indeed, in only *six* houses does it reach twenty-five per cent. In one schoolroom it is only *one per cent* of the floor area, in two others less than five, in seven less than six, in five less than seven, in thirteen less than eight, in eighteen less than nine, in twenty less than ten, in twenty-five less than eleven, in sixteen less than twelve, in eighteen less than thirteen, in eight less than fourteen, in five less than fifteen, and in thirty-one between fifteen and twenty-five per cent. Sixty-six out of the one hundred and seventy-six houses have less than ten per cent.

But all the faults of lighting do not lie in an insufficient amount. The direction from which the light is admitted is an important consideration which seems to have been almost entirely overlooked in the construction of the rooms. Among those best versed in school matters, it is agreed that the light should be introduced upon the left side only, although some modification of this rule has recently been suggested by schoolhouse architects, which allows it to enter somewhat more from behind.

In *forty-seven* of the houses the windows are placed *on all sides*, in ninety-three on three sides, in thirty on two sides, but in no instance are the windows upon one side only. In direct violation of even a common knowledge of the subject, the windows in *sixty-six*, over one third, of the houses are in *front* of the pupils.

Near-sighted pupils are reported in *thirty-one* of the schools. Fifteen teachers say that they have observed pupils to become near-sighted while attending school. Fifty-eight rooms have neither curtains nor blinds. In many instances the blackboards are reported as being in a bad state.

It is a well established fact that near-sightedness, myopia, is generally an acquired defect of the eye, although it is sometimes hereditary. It is most commonly acquired while attending school, and the defects in lighting, such as have been mentioned, are probably the most prolific causes.

HEATING.

With a few exceptions stoves are in use, and as a rule are ample. In some rooms a requisite degree of warmth could not be secured in very cold weather, owing to numerous cracks in the walls and floor. Wood is used for fuel in nearly every instance. Only seven reported insufficiently heated rooms.

WATER SUPPLY.

Thirty report no water supply whatever; sixty-six, from "neighbor's well"; fifty-one from wells, not stating whether they belong to the district or not; nineteen, from springs; and five, from brooks. Sixteen teachers report that the water supply is from a low source. Frequent statements are made that the well is located near some nuisance that might be a source of contamination.

In the above we have before us the fact that a great number of school children are subjected to a danger which is scarcely, if at all, recognized by parents. The pupils are allowed in a majority of the districts to obtain drinking-water where most convenient. Our experience in the examination of wells shows that a very large per cent of them contain water more or less polluted. It is evident to my mind, from a close study of the subject for several years, that the human system in many instances may acquire a toleration of the poisons which exist in a well of contaminated water, provided that the degree of pollution is not subject to sudden and marked changes, in the same way that the system acquires a tolerance for tobacco, opium, and other poisons when habitually used. A person accustomed to the use of a certain water, even though contaminated, cannot partake of polluted water from another source without being exceedingly liable to observe some disturbance in the system. Thus there is to every school which cannot supply its pupils with pure water an unseen enemy ever ready to prey upon the health and lives of the innocent children. This fact supplies one of the ways through which children that have been healthy at home receive typhoid fever or some other filth disease while attending school. In fact, "schoolhouse epidemics" from polluted water have probably been recorded in every state in the Union. The subject of drinking-water for the school children is exceedingly important to every parent.

PRIVIES.

The most abominable and disgraceful condition of affairs that could well be imagined, exists in connection with this subject. *Fourteen houses have nothing of the kind.* In one hundred and three districts there is only one privy, and that is common to both sexes. In sixty districts the condition is reported bad, in sixteen as fair, and the remainder are either classed as good or are not mentioned at all. In thirty-six districts the privy is connected with the house; in nine they are in the shed; in nine less than five feet distant from the house, in thirty-three less than ten feet, in fifteen less than fifteen feet, in twenty-three less than twenty feet, while the remainder are at varying distances above this figure.

OFFENSIVE NUISANCES

exist near the schoolhouse in sixteen districts, exclusive of the district privy which is not infrequently reported as a nuisance. In one instance the schoolhouse formed one side of a hog-pen. Stables, barnyards, swamps, etc., generally constitute the nuisances mentioned.

STRUCTURE, LOCATION, ETC.

Fourteen houses are constructed of brick and one hundred and sixty-two of wood. Ten only have cellars. Twenty are upon damp or swampy sites, or are so situated that water stands beneath them after rains.

DOORS.—LAW VIOLATED.

In 1875 the legislature passed a law requiring the doors of all schoolhouses afterward constructed to be swung outward. The survey shows that of the number reported, twenty-five were constructed since the date above mentioned. Of these twenty-five only five are constructed as required by law, twenty having been built in violation of its requirements.

PHYSIOLOGY AND HYGIENE.

Fifty-nine teachers report that physiology is taught in their schools. Twenty-six, however, have only one pupil each pursuing the study. The total number reported as studying this branch is one hundred and eighty-one, while the total number of pupils aggregates over twenty-two hundred. Twelve teachers, in addition to the above, teach it orally.

In concluding this brief presentation of facts, I would say that a definite plan for measures to remedy these conditions will probably be presented by this board to the next legislature. By that time we shall have completed the survey throughout the state, and shall be in possession of the most complete information regarding our schoolhouses that has ever been secured. That something should be done to give the school children of our state a better protection against unsanitary evils, is plainly to be seen.

CHRONIC LEAD POISONING

FROM DRINKING WATER CONVEYED THROUGH A LEAD PIPE.

BY FREDERICK W. JONES, M. D., NEW IPSWICH, N. H.

While diagnosing a case in an adjoining state during the fall of 1885, my attention was called to a feeble and cachectic-looking lady seated in a corner of the room, crouched down in her chair like a cripple. When introduced she did not rise, and but scarcely changed her troubled countenance.

On making inquiries the next day in regard to her condition, she said, "I have rheumatism. Pains commence at times in my bowels and radiate over the abdomen and chest; I also have pains in my limbs."

Finding that she had obstinate constipation, with abdominal tenderness and pain, a bad breath, a metallic taste in her mouth, and a *cachexia* indicative of slow poison, I asked her to exhibit her tongue. After examining it, I turned the lips over the gums and found the marked lead line extending from the incisors to the last molars on each jaw. I immediately said, "Your case is one of lead poisoning." She exhibited great surprise, saying, "I have rheumatism, and have been treated for it, only leaving my house one week ago on account of increased illness and inability to labor."

I ascertained that the lady had been sick about one year, had drank water brought through a two-inch lead pipe by pumping from a well, situated five rods away. Her sister, who had been occupying the same house, had been ill for three years, also unable to do any work during this time. Her mother had died in the same house since the lead pipe had been in use. A relative, who was very healthy, had visited them each year during her vacation, and after leaving always felt exceedingly unwell, which she attributed to her extra exertions for those who were unwell in the house.

I analyzed a sample of the water,—most beautiful to the eye, and possessing the clearness of a diamond. The presence of lead was revealed. I now discovered that I possessed the secret in full, and that there could be no mistaken diagnosis, for I had found cases of chronic lead poisoning. I gave the usual remedies for lead poisoning, and in a few weeks the lady improved so much that she was able to do the housework for the family.

Let us as physicians make special investigations in all these obscure cases which are often overlooked in the busy routine of a medical practitioner's life. I firmly believe that a large number of persons are now suffering in our state and all parts of New England from chronic lead poisoning, due to drinking water conveyed through lead pipes. My father, Dr. Frederic Jones, a few years ago found three persons in one family sick with lead colic.

WATER-WORKS OF ROCHESTER.*

BY J. F. SPRINGFIELD, C. E., ROCHESTER, N. H.

Although the inhabitants of Rochester for many years have felt the need and necessity of a better supply of water than that attainable from its shallow and surface-draining wells, yet whenever the outlay required for such improvements over the old methods was considered, "such luxuries," as they were called by the non-progressive individual, were, until very recently, never regarded as indispensable.

The nature of the soil is such that all liquid waste and impurities of all sorts contained therein would inevitably find their way into the wells before there had been sufficient filtration to arrest this foreign matter, which is so detrimental to the health of the consumer.

The subject of a water supply had long been talked of and discussed by the more enterprising citizens of the town, but it was not until about ten years ago that the idea seemed to meet with sufficient favor and approval to warrant its public consideration.

A little later than the above date an act was passed in the state legislature granting to the town the right of bringing in water for the domestic uses of its inhabitants; but on account of some oversight on the part of one of the gentlemen who had the matter in charge, the same failed to become a law. By this time, however, the interest of the population in general had been aroused, and in the warrant for the annual town-meeting, March, 1877, an article was inserted to ascertain the prevailing sentiment of the town in reference to the enterprise.

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* This extensive and complete history of the Rochester water-works, prepared by Mr. J. F. Springfield for his own use, but through whose courtesy we are able to present to the public, is of great value to any town contemplating the construction of a public water supply. Besides its importance as a history of what Rochester has done for the good of her people in supplying an abundance of good water, thereby rendering it possible for her citizens to abandon wells that, if not already polluted, are in danger, the specifications, etc., will be of great assistance in indicating to other water companies a safe and proper method of procedure. [Secretary.

The matter was thoroughly discussed, and it was voted to authorize the selectmen of the town to secure the services of a competent engineer, and have him report upon the feasibility of Round pond and Ricker pond as sources of supply; and it was in the month of June of the same year, 1877, that "the Senate and House of Representatives, in General Court convened, of the State of New Hampshire," passed an "act" to incorporate the Rochester Aqueduct and Water Company. And this, we may say, was the preliminary step to the work which was not in reality to be undertaken until some eight years subsequent.

In the autumn of 1877, James A. Weston, C. E., was employed to make surveys to the above mentioned places, and to report upon the same, and also upon the probable cost of the work.

The first proposed source of supply was Round pond. This body of water covers about 100 acres, and has a watershed of a little more than 200, making in all, pondage and watershed, about 300 acres. The pond lies westerly from Rochester village, in the township of Barrington, and about 3¾ miles in an air line from the central portion of the town, and its elevation is about 160 feet above the average level of the village.

The other source of supply considered was what is known as Ricker pond. The pond is formed, mainly, artificially by a dam formerly built across the brook bearing the same name, said dam having been constructed upon the site of an old mill privilege; but both mill and dam have long since gone to decay. The distance from this source to the town would be about the same as from Round pond, while its elevation would be from five to seven feet greater. The area of the watersheds would probably be about the same in both cases.

Analyses of the water from the two places seemed to show that Round pond was rather preferable to Ricker pond, as it contained less solid matter, and being softer was better adapted to domestic use, though the water from either source compared very favorably in general quality with that used for domestic purposes in our neighboring New England cities and towns, and particularly the Round pond water, which was pronounced to be *exceptionally good*.

Mr. Weston reported favorably upon taking water from the last named place in preference to Ricker pond, although the outlay would probably be about the same in either case. His estimate on the cost of taking water from Round pond, exclusive of land damage, was as follows :—

Expense of works at the head	$2,000.00
29,100 feet 12-inch cast-iron pipe, @ $2.00	58,200.00
6,000 feet 10-inch cast-iron pipe, @ 1.65	10,230.00
15,100 feet 6-inch cast-iron pipe, @ 1.00	15,000.00
25 gates, required sizes, set complete	1,320.00
45 hydrants @ $55.00 each	2,475.00
Service pipe	2,000.00
Agencies, engineering, and contingencies, 10 per cent	8,675.00
Total estimate of cost of construction	$100,000.00

Apparently this outlay was sufficient to frighten the average individual and to somewhat dampen the ardor of the warmest enthusiasts, for nothing further was done; even the charter was not formally accepted till 1880, and then not until April of the following year was the first corporation meeting held.

Another four years elapse and we find the corporation, as it were, springing into life anew, and this time having sufficient strength to assert itself and assume manly proportions. We now hear of it having its $100,000 worth of stock taken up and being ready to commence active operations. Accordingly in the early spring, 1885, Mr. J. A. Farmington, C. E., of North Conway, N. H., was chosen engineer of the company. Surveys were at once begun and preparations for the work entered upon.

After thorough examinations and accurate surveys, this gentleman saw that what might have been, and what apparently was, an adequate supply a decade ago, when the previous surveys were made, was not sufficient for the demands of the future.

Mr. M. M. Tidd, C. E., of Boston, Mass., who had been chosen consulting engineer by the company, coincided with the opinion of Mr. Farmington, and further surveys were made for suitable and adequate watersheds to meet the future requirements of the growing town. It is not our purpose to discuss the various schemes which were presented to meet the conditions of the problem, but we will pass to the consideration of the one which was finally adopted, and the one which is properly the subject of this paper.

The watershed finally selected was a tract of territory situated in the townships of Rochester, Barrington, and Strafford, and drained by a stream known as the Berry brook. It comprises an area of about six square miles, which is ample for all present and probably all future demands of the place, provided the water could be suitably impounded; and it was relative to this last point that the varied and somewhat difficult problems in the science of civil and hydraulic engineering arose.

At this point let us consider a few fundamental principles relative to a water supply in general, as to the extent of watershed required for a given place, and approximately the quantity necessary to allow daily for each inhabitant.

First, quantity required. The quantity of water required daily by each individual depends very much upon the surrounding circumstances of the locality, the occupation of the people, the various industries, the size of the place, and, indeed, the refinement of the inhabitants is a factor which should by no means be neglected.

By the study of statistics in reference to this point many interesting if not surprising features may be observed. To begin with, a careful perusal of the data in this line reveals the fact that the amount of water used, i. e., consumed and wasted in England and other European countries, is vastly less than the quantity used in our American cities and towns.

For example Prof. Rankin gives an estimate of the quantity of water required in England, and the same is based upon what seems an accurate data. It is as follows:—

	GALLONS PER DAY.		
	Least.	Average.	Greatest.
Amount used for domestic purposes	7	10	15
Washing streets, extinguishing fires, supplying fountains, etc.	3	3	3
Trade and manufactures	7	7	7
Waste under careful regulations about	2	2	2½
Total demand per individual	19	22	27½

Thus we see that twenty-two gallons daily per capita were considered as the average quantity required for the various uses.

To contrast with these figures, let us notice the actual consumption in some of our American cities for the last few years. For instance, according to reports for 1882, the following was the number of gallons used per capita, per diem, in some of the most populous cities in the United States :—

Boston, 99 gallons to each individual daily.
Chicago, 114 " " " " "
Detroit, 149 " " " " "
Philadelphia, 66 " " " " "
New York, 79 " " " " "
Washington, 176 " " " " "

The above comparison is sufficient without comment or elucidation to prove the excess in the demands of the cities of the United States over the amount required by the European cities and towns. And the chief cause to-day, probably,—or at all events a good one,—of so many of our citizens complaining of an insufficient supply of water, is due to the fact, that in former years—in the early period of water supply in this country—the estimates of our engineers were based upon data obtained from Europe, and because of such a variation in the amount required in the two localities, we find our American cities put to this enormous expense of securing "additional water supply."

Another fact, which needs to be carefully noted, is this : that whenever good, pure, wholesome water has been supplied, the quantity used daily by each individual has been greatly increased over the amount required a few years ago for the same places. A study of the data obtainable on this point will show that in many places the quantity required has increased one half, and, indeed, it is by no means uncommon to note cases where it has more than doubled.

Mr. Fanning gives the following as the approximate consumption of water in American cities where there is a good supply adapted to domestic uses, and suitable for the arts and mechanical purposes; and the classification is so divided as to enable one to form a comparatively accurate estimate of the quantity required to meet the demands of the place in question, after having studied carefully its various conditions and surroundings, at the same time keeping its future prospects sharply in view :—

a. For ordinary domestic use, not including hose use, 20 gallons per capita per day.

b. For private stables, including carriage-washing, when reckoned on the basis of inhabitants, 3 gallons per capita per day.

c. For commercial and manufacturing purposes, 5 to 15 gallons per capita per day.

d. For fountains,—drinking and ornamental,—3 to 10 gallons per capita per day.

e. For fire purposes, 1-10 gallon per capita per day.

f. For private hose, sprinkling streets and yards, 10 gallons per capita per day during the four driest months of the year.

g. Waste, to prevent freezing of water in service pipes and house fixtures in northern cities, 10 gallons per capita per day during the three coldest months of the year.

h. Waste by leakage of fixtures and pipes, and use for flushing purposes, from 5 gallons per capita per day upward.

Finally, Mr. Fanning gives the following as the approximate estimate of the average daily consumption, basing his calculations entirely upon the population :—

Places	of	10,000	population,	35	to	45	gallons	per	capita.
"	"	20,000	"	40	"	50	"	"	"
"	"	30,000	"	45	"	65	"	"	"
"	"	50,000	"	55	"	75	"	"	"
"	"	75,000 and upwards		60	"	100	"	"	"

Accordingly we see, then, that 50 gallons per capita per day, is certainly adequate for all probable demands of the place under consideration; and that allowance will afford a liberal supply for the various mechanical purposes to which, doubtless, a large quantity, sooner or later, will be applied, owing to special circumstances, which I will not take the time and space to describe.

Second, watersheds. For the figures relative to the available supplying capacity of watersheds in general, again I am indebted to Mr. Fanning. In his calculation for the mean annual quantities of low-cycle years, applicable for domestic consumption, the following is his estimate, assuming a mean annual rainfall of 40 inches, which is a little in excess of the actual amount in this section of New England.

Flow of stream available for storage, 40 per cent of mean rain, or 16 inches.

This available rain is applied as follows :—

1. Compensation to riparian owners, 16 per cent of mean rain, 6.72 inches of rain.
2. Evaporation from surface of storage reservoir, 2.4 per cent of mean rain, .96 inches of rain.
3. Percolation from storage reservoir, 2.4 per cent of mean rain, .96 inches of rain.
4. Balance available for consumption, 18.4 per cent of mean rain, *7.36 inches of rain.*

Total, 40 per cent of mean rain, 16 inches of rain.

Hence, reckoning 7.36 inches as the available amount from the 40 inch rainfall over an area of one square mile, we find the total quantity per annum to be 17,098,762 cubic feet of water, which would be sufficient for a daily supply of 7 cubic feet (52.36 gallons) per individual to 6,692 persons.

This is what Mr. Fanning considers as the average supplying capacity of a unit area (one square mile) of watershed.

Then, of course, there are various circumstances to affect the general result, such as the allowance for the years of minimum rainfall, the surplus or deficiency of the monthly requirements, if the storage reservoir is not of sufficient capacity to impound a supply adequate for quite a period, and the fact as to whether it is possible at all to store the flood flow.

All these, and several minor points, must be considered, and then, too, a great many local conditions are to be regarded, whereby the fundamental factors may be materially affected. For instance, the permeability of the soil influences the problem in a great degree. When the earth is very porous and no impervious stratum underlying, i. e., at a reasonable depth, but a small proportion of the quantity that could be made available under more favorable circumstances, such as a non-porous, solid, and impermeable soil with precipitous slopes, could be utilized.

Thus we see that while it is possible to arrive at the general results, a thorough knowledge of all the particulars and circumstances pertinent to the case in hand are indispensable, if accuracy is at all desirable. And while Mr. Fanning is doubtlessly on the safe side, in the approximate result, it is necessary to observe with the utmost care and precaution how the assumptions, which must be made in the given case, compare with those upon which his results were based, and thus it may be possible to obviate, oftentimes, much unnecessary expense, which is, in large works, such as the water supply of a city in almost every case, often the prime factor for consideration.

Finally, we may say in general, that we can reckon on one square mile of watershed as being an area sufficient to furnish a supply for about 7,000 people, provided all circumstances are favorable for storing, etc.; and as the surrounding conditions of the place under consideration seem to be, on the whole, very well adapted for securing the best results, we may assume that the watershed, six square miles, is adequate for supplying 40,000 persons with an ample quantity of water for all domestic purposes.

Having settled upon the watershed as being sufficient for all presumable demands of the place, the next question which naturally arose was, "How, and in what manner and place could the water be most advantageously and economically impounded?"

Unfortunately, the area selected to furnish the supply did not lie in the same watershed as the town, but was separated from the same by a ridge varying in height from quite an elevation, where the stream flows nearest the town, to a slight eminence, just sufficient to separate the drainage area, as the source of the stream is approached.

Upon the stream side of the dividing ridge there was no favorable site for impounding the water, but upon the other side of the ridge, and also nearer the town, was an admirable site for a reservoir, and one which would ever be ample in size. Hence it became necessary to bring the water over the elevation by pumping, or through it by a deep canal or conduit of some sort. The site chosen for the reservoir was in the valley of the Hart brook, in the townships of Rochester and Barrington.

The spot selected for the dam was at a point where the valley divided itself into two arms or branches, between which arose quite a prominence. Indeed, this elevation extended a few feet above the required height of the dam, so that fully one third of the width of the valley was provided with a dam by nature herself. A dam twenty-eight feet in height, constructed at this point, is sufficient for furnishing a pondage of over fifty acres, and at a distance of more than two thousand feet therefrom, the difference in elevation along the bottom of the valley is less than three feet, which fact shows that for a considerable distance the reservoir maintains its depth, and being, as it is, surrounded by rocky and quite precipitous banks upon the sides, the comparatively large surface of shallow water, which is the characteristic of the proportion of the "natural basins" so-called, and a very objectionable feature in a city water supply, is largely avoided.

Plate I. shows a plan of the reservoir basin; its maximum length is about forty-two hundred feet, maximum breadth nine hundred feet.

Its capacity when full will be about twenty-four million cubic feet, or about one hundred and eighty million gallons. This quantity would be sufficient, without admitting a single gallon, to furnish fifty gallons daily per individual for five thousand inhabitants during a period of more than two years.

It was the first proposition to construct the dam at the point indicated upon Plate I. which is marked "Proposed Dam." Had the works been constructed upon that site the capacity of the reservoir would have been about one third of what it is at present. The amount of material used in its construction would have been considerably diminished and hence the cost lessened in quite a degree, yet, to offset this was the extra amount of valuable pondage secured and a slight saving in the length of the main pipe line, the lower and final site being nearer the town, and, as far as could be ascertained by repeated soundings and borings, a much better bottom was obtained at the site selected than could be found at any other feasible point in the valley; so for other considerations than that of the extra area of pondage was the above mentioned site decided upon.

We shall defer a description of the actual construction of the dams and the appurtenances thereto until we have considered one or two other features in reference to the remaining parts of the work. First, let us consider the pipe line, the main and the distribution system.

As the accompanying copy of the "Invitations for Bids," "Proposals," "Specifications," "Contract," etc., shows ——— ———, of ———, received the contract for furnishing the water pipe, special castings, etc.

Delivery was commenced the first of August, and continued, according to the specifications and agreement, until the whole amount had been received.

The actual quantity laid was as follows:—

16-inch pipe	120 feet (waste).
12-inch pipe	22,308 feet (main).
8-inch pipe	3,122 feet (distribution).
4-inch pipe	92 feet (blow-off discharge).
10-inch pipe	6,015 feet (distribution).
6-inch pipe	17,049 feet (distribution).

As the minutest description and details can be found in the "Specifications," I will not dwell upon this point longer.

The gates and hydrants were furnished by the ——— ———, ———, and the number and respective sizes were as follows:—

1 16-inch gate, double seat.
3 16 x 16-inch sluice gates, single seat.
10 12-inch gates, double seat.
19 10-inch gates, double seat.

9	8-inch gates, double seat.
45	6-inch gates, double seat.
5	4-inch gates, double seat.
49	2-nozzle hydrants.
2	3-nozzle hydrants.

In response to the invitations issued for bids for pipe-laying and the construction of the reservoir dams, eight or ten proposals for each were received.

Messrs. ——— ———, of ———, secured the contract for the pipe-laying, while all bids on the construction of the reservoir dams were rejected, and it was decided that the work should be performed by day-labor employed by the company.

Accordingly, work was commenced upon the reservoir in the latter part of the month of July, and prosecuted until cold weather necessitated its suspension. Pipe-laying was begun in the early part of August, and completed at about the same time as the suspension of the work upon the dams. Detailed information relative to the requirements in the pipe-laying can be found in the specifications.

In this part of the work no special difficulties were encountered. About two miles of the main line were quite rough and wild, considerable stone being found, though very little in the form of ledge, the principal part being bowlders. For quite a distance the line skirts the low meadows, it being a choice whether the rough, rocky upland should be followed, or the lower, moist portions. Of the two evils, the latter was chosen as being the lesser. Through the route selected the ground water was more or less troublesome for quite a proportion of the main line, yet no serious obstacle was presented in this, except the extra work required in pumping and bailing the water, in order to keep the trench in proper condition for calking the joints.

Throughout the entire line, with possibly one exception, the soil was of sufficient compactness and stability to afford a suitable foundation for the pipes, so that, with this one exception, "shoring" was not required.

The line crossed two or three small creeks, as is shown upon the profile, but in all cases, excepting one, the topography of the

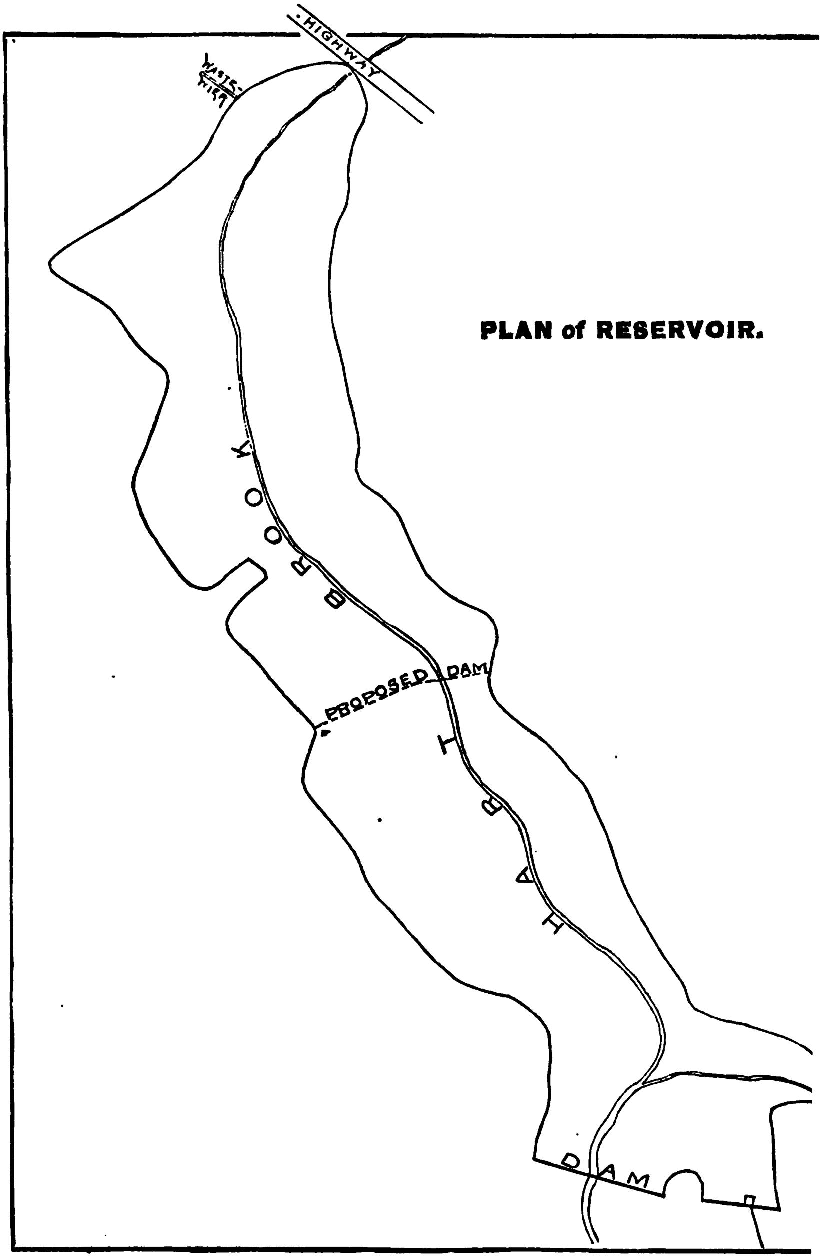
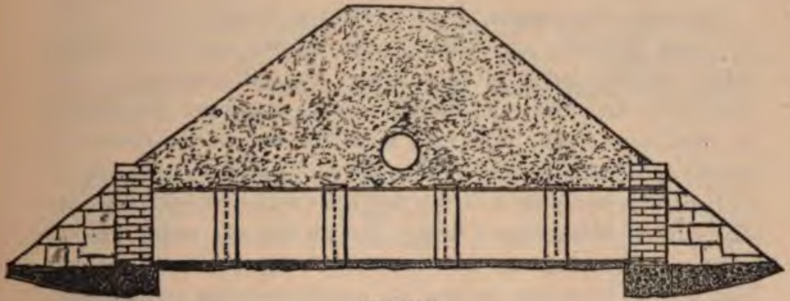

HIGHWAY
WASTE-WEIR
PLAN of RESERVOIR.
HART BROOK
PROPOSED DAM
DAM

PLATE I.

land upon each side of the streams permitted the pipe to pass under without deep cutting.

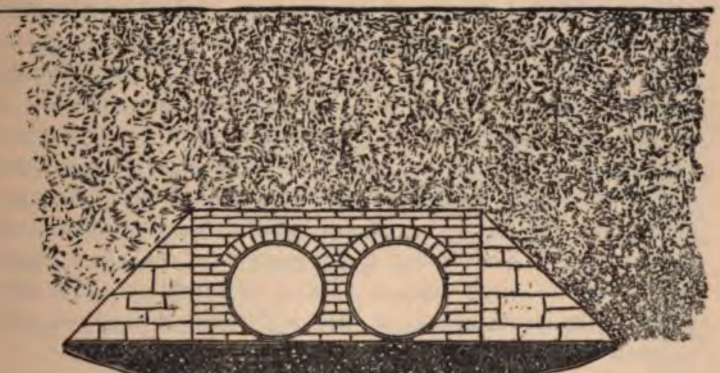
At the small creek called "Hurd Brook" it was necessary to carry the pipe above the surface of the brook, and a pipe culvert was constructed to allow the passage of the water. Plate VIII. shows a transverse section and also a side elevation of the same.

PLATE VIII.



SECTION.

HURD BROOK CULVERT.



ELEVATION.

The culvert was formed by laying two parallel lines of ordinary earthenware pipe, twenty-four inches in diameter, which was considered of ample size to admit the passage of the maximum amount of water which might accumulate at any time in the basin drained by the above mentioned brook. The material for the embankment at this point, which, by the way, is the only spot upon the line where the pipe is above or upon the natural surface of the ground for any distance, was very easily obtained; so by handling a comparatively small quantity of earth, and putting in the culvert, excessive cuttings upon the sides or the use of special castings were avoided, and a decided improvement in the line made.

The main line crosses Cocheco river at Bridge street. Here no great difficulty was encountered, as the place of crossing which was selected is between two of the mill-dams, and it was possible to draw the water down and have an almost dry bottom to work over. The pipe rests upon the bed of the river, protected upon each side by an abundance of riprap.

It became necessary to cross the river with a 10-inch distribution pipe at Market-street bridge, though this was rather more a matter of convenience than necessity, because the westerly portion of the town can receive its supply from the 10-inch pipe, leaving the main at the junction of Tebbets avenue and River street; so that the chief object in making the connection between Elm and Market streets was to avoid the "dead end," which would otherwise exist at the head of the latter street. As the river at this point is quite deep, and several other difficulties would be met if the pipe was carried across upon the bed of the stream, it was considered a more feasible plan to carry it over the bridge and provide two gates with drip-cocks,—one at either side of the river,—and thus avoid freezing by shutting the water entirely out of this piece of pipe during the coldest weather. There being no special need of a connection at this place, except on account of circulation, or in case of repair upon the other main, or some contingency in case of fire, this arrangement had no obstacle in its way.

I simply mention this as being sort of a novelty in the manner of construction, obviating the expense of a frost-box, or the still greater expense of passing under the stream, and being a method of overcoming an obstacle which I think is by no means uncommon, yet it was met in a manner which was entirely original, as far as my knowledge goes.

It will be seen that it was not stated in the specifications whether wooden or iron gate-boxes were to be used. When they were drawn, it was not definitely settled which would be adopted, and special arrangements were made in reference to this point. It was decided, however, to use the iron as being in every way preferable and more convenient, and withal not very expensive. They were placed over all air valves, as well as the ordinary stop-gates.

To show the uniformity of the slopes and the slight variation in level of the different sections of the town, I give below the elevations of the street intersections above mean high tide at Portsmouth, N. H. :—

Central Square, street crossing	227.5
Market street, corner of Bridge street	226.8
Market street, corner of Union street	226.7
Market-street bridge	226.5
Main street, corner of Arrow street	227.1
Main street, corner of Railroad avenue	224.7
Main street, corner of Liberty street	223.9
Main street, corner of Wentworth street	223.1
Main street, corner of Academy street	221.8
Main street, corner of Winter street	221.7
Main street, corner of Knight street	221.0
Main street, corner of Lincoln street	220.1
Main street, corner of North Common street	218.7
Main street, corner of South Common street	216.5
Bow street, corner of Arrow street	225.9
Bow street, corner of Charles street	223.4
Bow street, corner of Myrtle street	223.1
Charles street, corner of Liberty street	223.1
Charles street, corner of Myrtle street	223.0
Charles street, corner of Granite street	221.0
Charles street, corner of Knight street	219.9
Portland street, corner of Railroad avenue	225.1
Portland street, corner of Heaton street	224.5
Portland street, corner of Silver street	224.1
Portland street, corner of School street	224.4

Winter street, corner of School street	221.7
Winter street, corner of Silver street	222.0
Winter street, corner of Heaton street	222.0
Wakefield street, corner of Hanson street	227.3
Wakefield street, corner of Autumn street	226.3
Wakefield street, corner of Summer street	226.9
Wakefield street, corner of Union street	228.1
Wakefield street, corner of Pleasant street	229.2
Elm street, corner of River street	227.0
Elm street, corner of Pine street	227.1
Elm street, corner of Maple street	226.1
Elm street, corner of Jackson street	228.7
Elm street, corner of Washington street	231.2
Elm street, corner of Park street	234.6
Walnut street, corner of High street	238.6
Highland street, corner of Jackson street	225.0
Highland street, corner of Maple street	223.2
Highland street, corner of Pine street	226.6
Highland street, corner of Tebbets avenue	229.8

The various sizes and lengths of the different pipes are as follows:—

Length of 12-inch pipe from reservoir to head of Tebbets Ave.

	Feet.*
12 inch pipe upon Tebbets avenue	
12 " " " River street	
12 " " " Bridge street	
12 " " " Market street	
12 " " " Main street	
10 " " " Elm street	
10 " " " Market street	
10 " " " Portland street	
10 " " " River street	

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* Exact data could not be obtained.

CONSTRUCTION OF DAMS, GATE-HOUSE, CANAL, ETC.

The works at the head require the construction of a reservoir, canal, and a small dam for turning the course of the Berry brook, in order to make the same available.

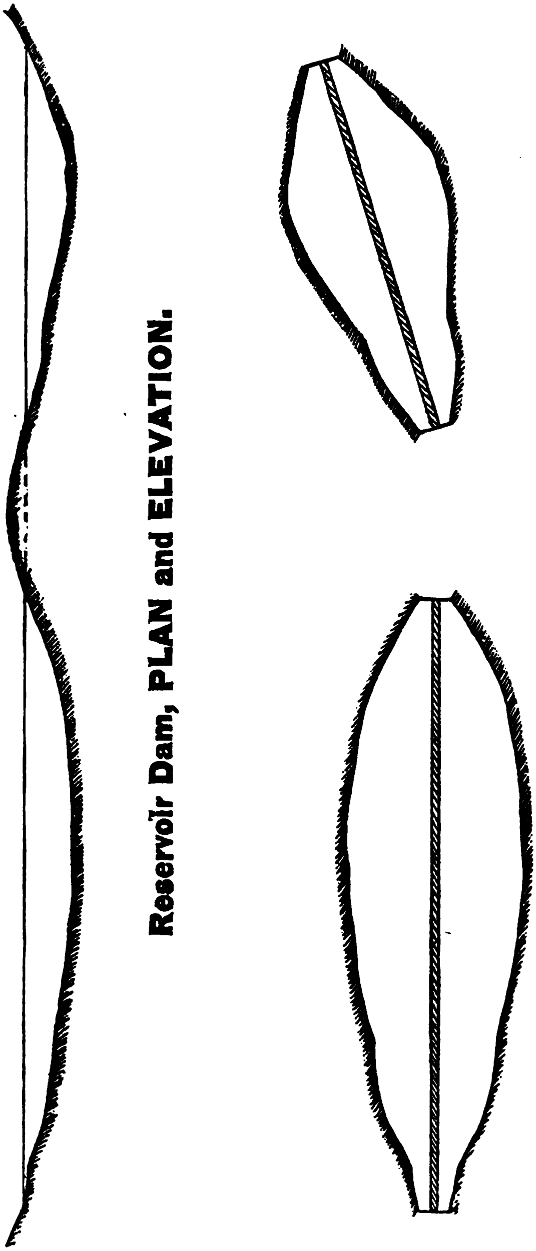
First, let us consider the construction of the reservoir. Plate I. shows a plan, with the position of dams, gate-house, waste-weir, and inlet of canal indicated.

As has already been stated, the reservoir covers an area of a little more than 50 acres; the banks for the most part are very rocky and quite precipitous, thus affording a site admirably suited by nature for the purpose for which it was chosen. In order to make this area available for the storage of water, the two forks or branches of the Hart-brook meadow, 354 and 222 feet in width, respectively, were dammed.

Plate II. represents an elevation of the sites for the two sections of the dams, and also a plan of the surface as prepared to receive the embankment.

A section of the dam is shown upon Plate VII., and the same drawing also represents a section of the gate-house, of which I will speak later. As is indicated upon the plate and as set forth in the specifications, the dam consists of a core wall surrounded by an embankment of earth. The wall is built of small stone, carefully laid in a good quality of cement mortar, having the inner side thoroughly plastered with cement in order to form an impervious barrier within the embankment. It is four feet wide at the bottom of the foundation, and its width is uniform up to the natural surface of the ground; then it is battered to a uniform thickness of 18 inches at high water line. The wall rests upon bed rock throughout nearly its entire length. There is a short space, however, in the west section, a little east of the center, where the wall does not extend to the underlying stratum of rock. On either side of this narrow space the inclination of the ledge made a sudden dip, and borings proved that it was impracticable to attempt to reach the rock.

At a depth of 17 feet below the surface, an impervious stratum of very fine blue clay was found, which seemed practically almost as impermeable as the rock itself, and upon this as a foundation, the core wall rests for about 30 feet.



Reservoir Dam, PLAN and ELEVATION.

PLATE II.

On either side of the core is an embankment of earth. It is 15 feet wide on top and built on a slope of one and one half horizontal to one vertical. It was built very closely to the requirements of the specifications, being composed of a very good quality of earth, well moistened, and thoroughly rolled and rammed, as the successive layers—never more than 6 or 8 inches in thickness—were added. The inner slope is to be covered with riprap, 18 inches in thickness, while the top and outer slope are to be covered with soiling to a depth of one foot. Thus the width of dam on top is in all about 18 feet.

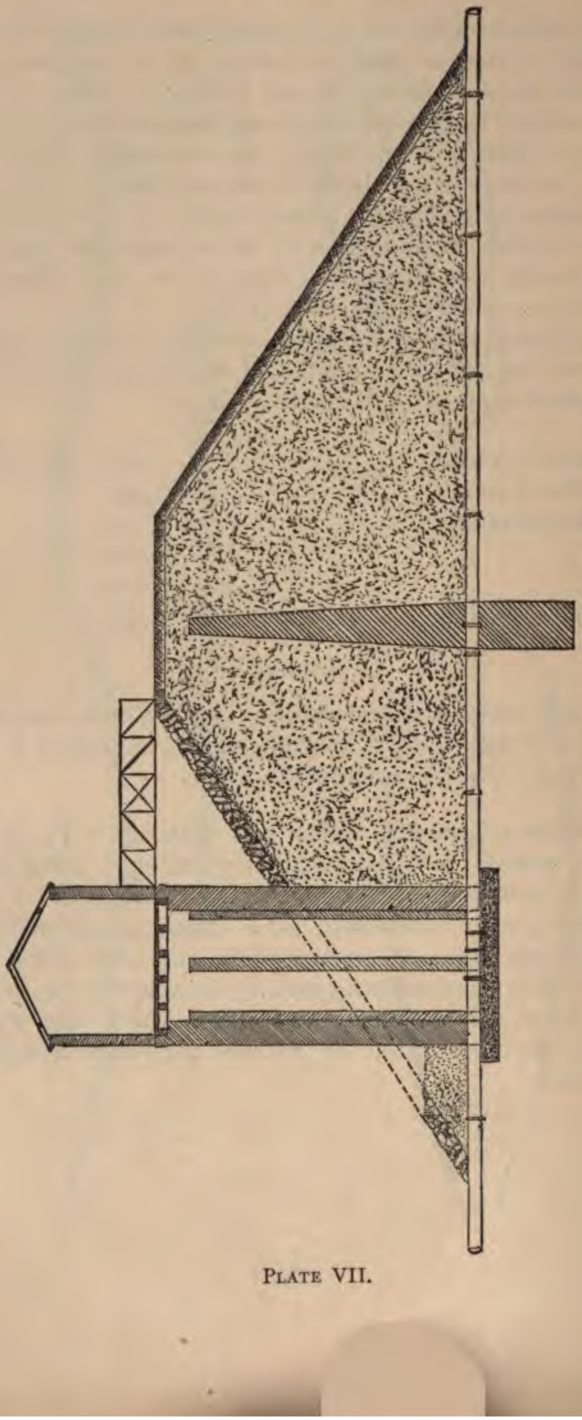
The following is the approximate amount of material, exclusive of the grubbing and the preparation of the surface to receive the embankment required for its construction :—

Excavation in earth	2,000	cubic yards.
Excavation in rock	1,000	" "
Embankment earth	16,000	" "
Soiling	1,000	" "
Riprap	1,000	" "
Masonry,—core wall	1,300	" "

GATE-HOUSE.

The gate-house, or gate-chamber, is built of brick and stone masonry laid upon a bed of concrete, which is at least 18 inches in thickness. The dimensions are as follows :—

The house proper, from outside to outside, 13′ 6″ by 11′ 6″; concrete extends 18 inches beyond the wall upon either side, making its surface 16′ 6″ by 14′ 6″. The outer walls are of rubble masonry, 2 feet in thickness, laid in cement mortar similar to that employed in the construction of the core wall. There is a lining of brick 8 inches thick extending from the the top of the foundation to the high water line; this is shown upon Plates III., IV., and V. Between the inner and outer walls is an inch of cement.



SECTION of GATE HOUSE and DAM.

PLATE VII.

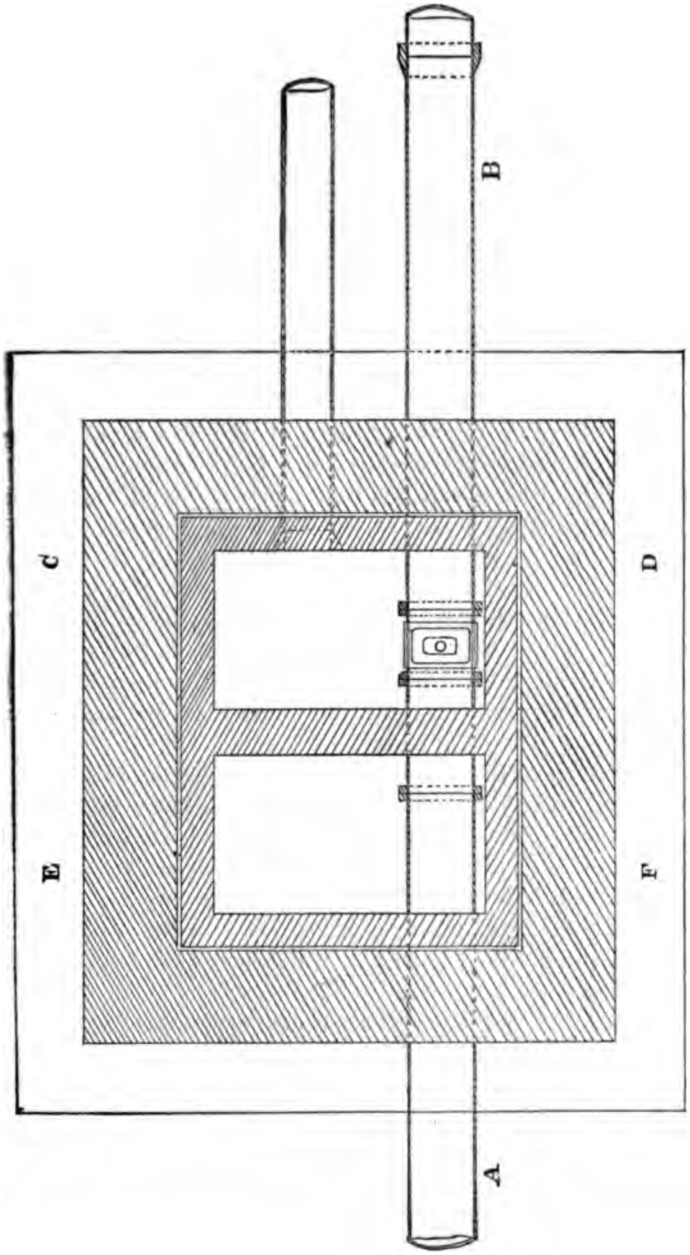


PLATE VI.—SECTION OF GATE-HOUSE THROUGH E F, PLATE III.

Plate VI. represents a plan of the chamber and foundation, though strictly it shows a section taken a few feet above the foundation, in order to represent the arrangement of the pipes. The smaller pipe is the main and is so placed as to receive the water from the inner chamber of the house.

The larger one is the waste pipe, sixteen inches in diameter; it is laid upon the foundation, and extends through the house without any immediate connection with it; though, should it ever become desirable to make such a connection, in order to obtain a greater supply than the twelve-inch can furnish, a short piece of flange pipe was inserted to render this possible without any serious inconvenience.

Plate III. represents a section through the house taken in such a way as to show the arrangement of the sluice-gates through which the water enters the chambers. There are three of these, each sixteen inches square, and beginning with the highest they are respectively 6.5, 13.5, and 21 feet below high water level. By means of these varying heights it is possible to always draw the water from such a distance below the surface as to obtain the best quality contained in the reservoir; and by regulating the height of draught to the rise and fall of the water, no inconvenience or annoyance will be experienced from such foreign substances as would be liable to float upon the surface of an impounding reservoir.

The heavier shading in the middle of the plate near the bottom indicates a section of the stop-wall, which is securely bonded into the side-walls, and built solid up to a height of five feet, or even with the bottom of the lower sluice-gate. Thus a chamber is formed which furnishes a place of deposit for any heavy matter which, by chance, may have been carried into the house by the current as well as any impurities which may have been arrested by the screens.

Resting upon this stop-wall are the screens, set in two lines, so that one of them can be removed for cleaning or repairing without shutting off the water. The screens are represented upon Plate IV. They are made of copper wire, firmly secured in wooden frames, which run in iron slides firmly bolted to the masonry.

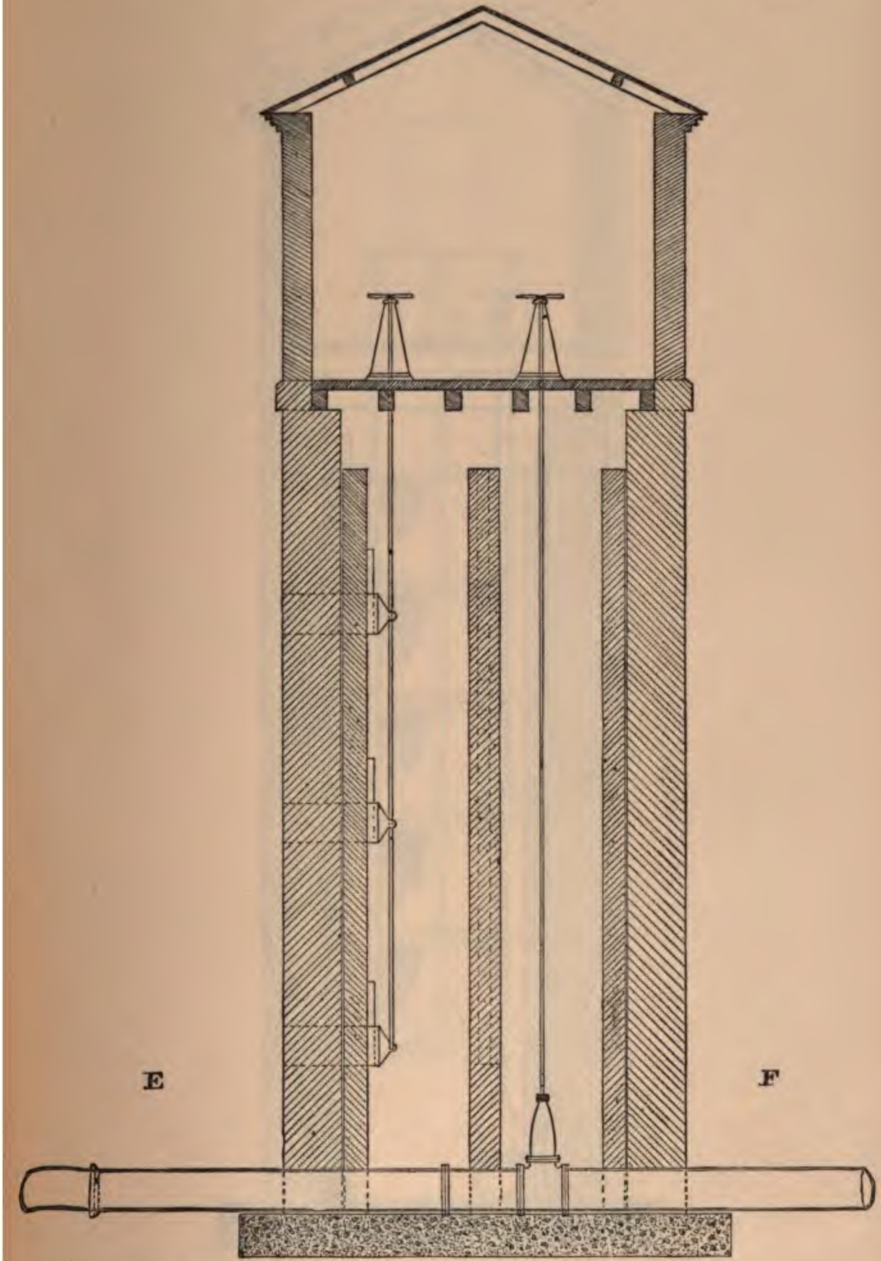


PLATE III.—SECTION OF GATE-HOUSE THROUGH A B, PLATE VI.

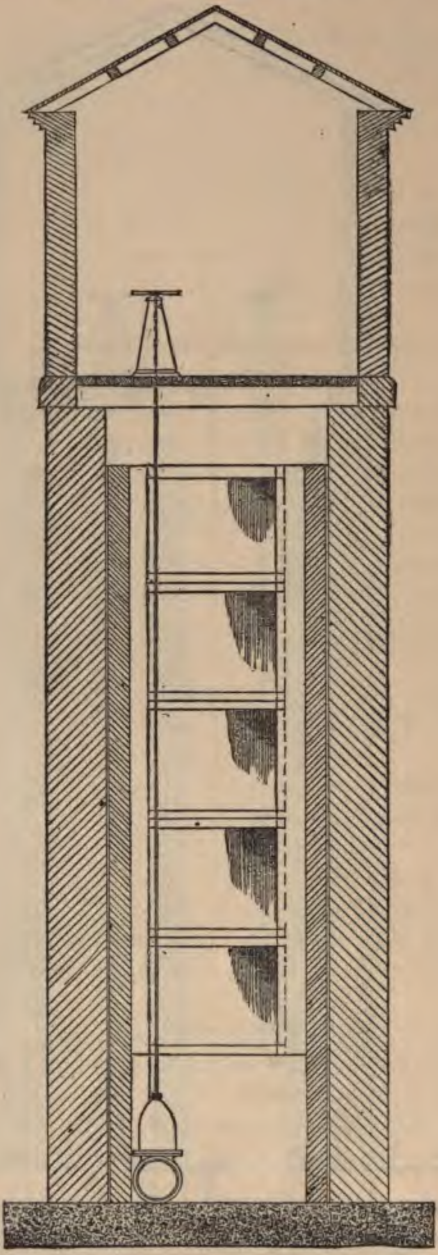


PLATE IV.—SECTION OF GATE-HOUSE THROUGH C D, PLATE VI.

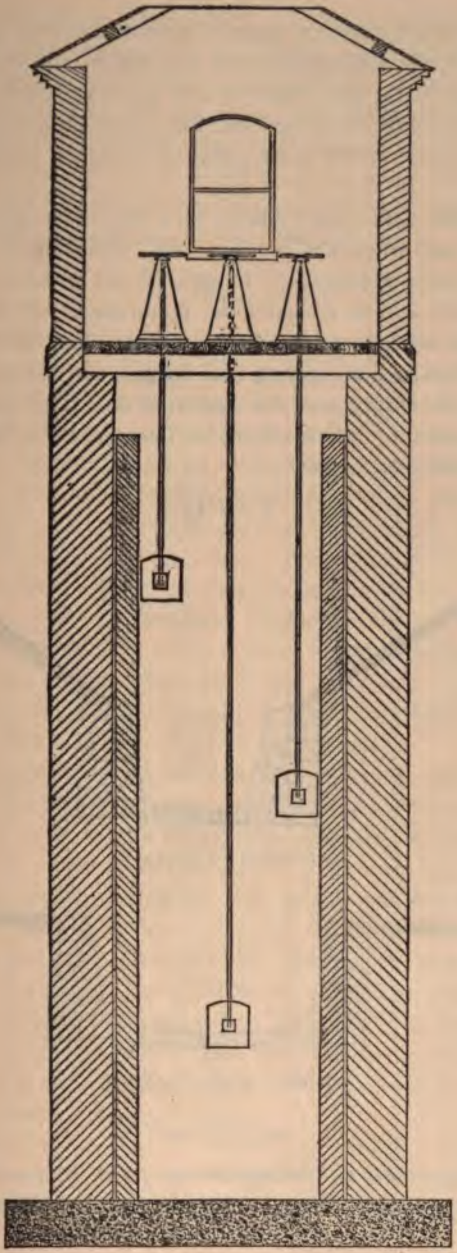
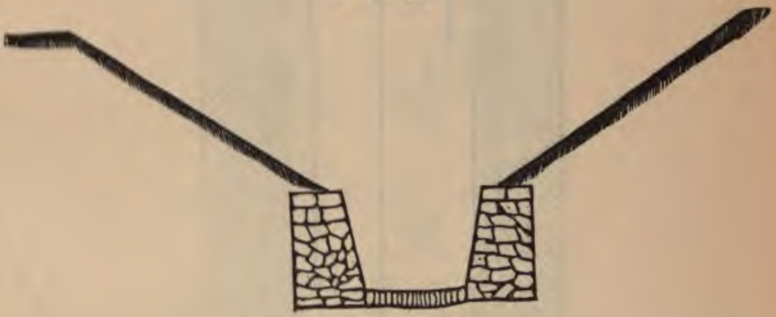


PLATE V.—SECTION OF GATE-HOUSE THROUGH E F, PLATE VI.

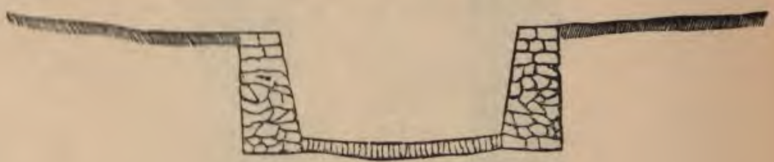
Plate V. shows a section taken behind the screens and indicates the shape of the sluice-gates with the stands and rods. In the construction of the gate chamber and house were employed about eighty cubic yards of stonework, forty-five cubic yards of brickwork, and about fifteen cubic yards of concrete, besides the iron fixtures.

The house, taken as a whole, is a very firm and substantial structure, and when the work is fully completed will present rather a pretty appearance, though to the ordinary individual who does not stop to consider the requirements of such a structure, it may seem somewhat heavy. But when one regards the tests to which such a building may be put, for instance, when the chambers are empty and the reservoir full, thus subjecting the walls to a pressure due to a head of twenty-five feet of water, all ideas of clumsiness vanish.

Plate IX.



Section of Canal.



Section of Waste-Weir.

WASTE-WEIR.

The waste-weir is to be built at the point indicated upon the plan of the reservoir, Plate I. Its construction will not probably be attended with any difficulties, as the site chosen is at the upper end of the basin, at a depression, so that the amount of excavation will be very small, and, moreover, there being gates and other appliances for regulating the quantity of water discharged into the reservoir, this may almost be considered an unnecessary precaution. A section is shown upon Plate IX. The invert is to be paved with carefully assorted stone laid in a bed of cement, as is represented in the drawing.

CANAL.

The canal extends from the Berry-brook dam to the reservoir, a distance of about nineteen hundred feet, and of the entire length only about thirteen hundred required excavating. For the remainder of the course the channel of the Hart brook was followed, and this only needed straightening and smoothing up somewhat. The accompanying drawings show a profile* of the line, and Plate IX. represents a section taken near station five, which shows a cutting of 13.5 feet. This point marks the divide in the land, and from it, as may be seen from the profile, the surface slopes in both directions. Although the canal has been in use since December 1, 1885, it is not fully completed. Owing to the lateness of the season when this work was begun, and to the necessity of having it running at a specified date, it was left during the winter in an unfinished condition.

The total amount of excavation was about four thousand cubic yards of earth, a small quantity of stone in the form of bowlders. The work outside of the excavating consisted in strengthening the lower side of the embankment for a distance of about three hundred feet, as the cutting for that length was not sufficient to yield the amount of earth requisite for the suitable protection of the canal; and, moreover, for that distance the line was nearly parallel to the original course of the brook, and at certain seasons of the year quite a large amount of flood water is apt to be discharged, and hence extra precautions had to be taken on that account. The embankment, when completed, will be protected by a substantial covering of riprap.

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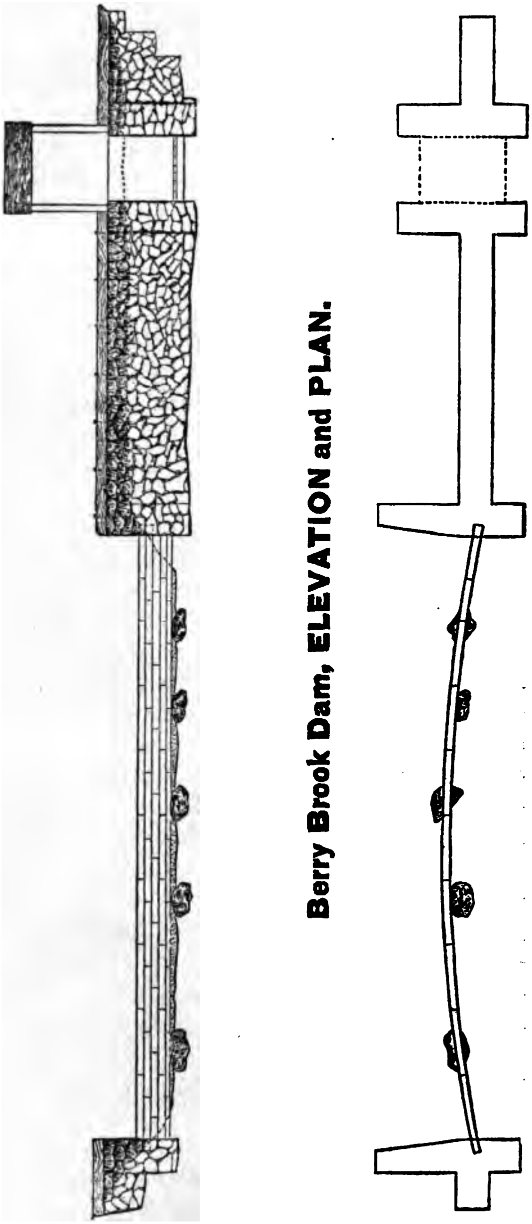
* The profile map is not reproduced in this paper.



Berry Brook Dam, ELEVATION and PLAN.

Plate X.

BERRY-BROOK DAM AND GATE-HOUSE.

These are shown, both in plane and elevation, upon Plate X. Their office is to control the waters of the above mentioned stream, so that they can be let into the reservoir whenever wanted. The structure is quite small of itself, yet it plays an important part in the entire scheme. It is built upon the site of an old mill-dam, yet upon the surface there was little to remind a person that such was the case; though during the process of excavating for foundation, etc., many interesting features were laid bare in reference to the skill employed upon the works, of which now only the faintest trace remains.

The diagrams, perhaps, indicate plainly enough what the works consisted of without any further explanation, yet I will give a few dimensions. The dam proper is six feet high, built of rubble masonry, and capped with a timber about one foot in thickness. The sluice is six feet wide, and over it, as the drawing shows, is a small wooden gate-house in which the gates are operated. The waste-weir, or overflow, is fifty-six feet long and is only about three feet above the bed of the brook. Its construction is a little unusual, I think, and for that reason I will give a brief description. Owing to the inability to dispose of the water during time of the construction, a rather peculiar scheme was adopted. The waste-weir was, in reality, formed by a built curved beam, firmly secured in the abutments at either side, made of oak, six by eight inches, cut into six-foot lengths, and then laid on a curve to a radius of one hundred and twenty feet, the convex side, of course, up stream. Each layer of timber was put on so as to break joints with the layer beneath, and securely bolted down with long iron lags. The up-stream side is filled with gravel, while the opposite side is carefully packed with riprap.

A FEW WORDS AS TO THE WORKS IN GENERAL.

As has already been stated, the canal is not completed, nor is the waste-weir from the reservoir constructed. The reservoir dams were up within about eight feet of the proposed height when the work was suspended last fall. The water was let into the reservoir, however, and about ten feet have been carried during the winter. This was used mostly for fire protection, though there has been a limited amount used for domestic purposes; but owing to the lateness of the season when the works were put in condition for supplying water, very little has been done thus far upon the distribution system. But this work, as well as the construction, will be resumed at an early date; and when the work is finally completed and everything put in order, the people of Rochester need to congratulate themselves upon being the possessors of a system of water-works which will yield such an abundant supply of pure, wholesome water. The general idea of the Rochester reservoir presents very nearly the ideal scheme.

First, there is the area drained, free from all sewage contamination and impurities caused by thickly populated districts; and the water, after being taken from the brook, carried about one third of a mile in an open canal which leads to the part of the reservoir most remote from the gate-chamber, more than four fifths of a mile therefrom, thus affording additional facilities for aeration and settlement, two requirements so essential in obtaining the best and purest water.

PROPOSALS

TO IRON FOUNDERS.

PROPOSALS FOR COATED CAST-IRON WATER PIPES AND FOR SPECIAL CASTINGS.—SEALED PROPOSALS FOR WATER PIPES AND FOR SPECIAL CASTINGS INDORSED.

Proposals for Cast-Iron Water Pipes for the Rochester Aqueduct and Water Company will be received at the office of the Engineer, at Rochester, N. H., on the —— day of ———, 1885.

Bidders are required to state in their proposals their names and places of residence; and also, too, that no person employed or appointed by virtue of any ordinance or legislative act relative to the supplying of water to the town of Rochester, has any interest in the proposal or contract; and also that the proposal is in all respects fair and without collusion or connection with any other person or persons making proposals for the same work.

N. B. The prices proposed must be stated both in writing and in figures, and all proposals containing bids not called for in this advertisement will be considered as informal. Each bid must be signed by the bidder, and accompanied by a bond for $———, conditioned for the execution of the contract (with satisfactory sureties for its performance) within the time specified in this advertisement, in case the bid be accepted; or in lieu of the bond aforesaid, a sum of money or other satisfactory collateral security may be deposited with the said Rochester Aqueduct and Water Company.

The persons to whom the contract may be awarded will be required to appear at this office, with the securities offered by him or them, and execute the contract within six days (not including Sundays) from the date of notification of such award, and the preparation and readiness for signature of the contract; and in case of failure or neglect to do so, he or they will be considered as having abandoned it, and the bond or deposit will be forfeited to the company.

The sureties of the bond for the contract must be residents of the state of New Hampshire.

The delivery of the pipes to commence in the month of July, 1885, and to be continued with regularity until the contract is completed. Bidders will state the price in the following proposals for each separate item of the pipes and castings. The prices are to cover all the expense of manufacturing and delivering on board cars at Portsmouth, N. H., all pipes and special castings.

The engineer's estimate of the work to be done is as follows:—

107 tons of 12 inch pipe, class A,
435 " " 12 " " " C,
56 " " 8 " " " C,
30 " " special castings.

163 tons of 12 inch pipe, Class B,
158 " " 10 " " " C,
200 " " 6 " " " C,

These quantities are considered as approximate, and the company, therefore, expressly reserve the right to increase or diminish the same, as in their opinion may be necessary, not exceeding 20 per cent of the straight pipe and special castings. The amount of security required will be such sum as may be fixed by the company after the proposals are opened, said sum not being less than one fourth nor more than one half of the amount of the contract. The company also expressly reserve the right to reject any and all bids, should they deem it for the interest of the company so to do.

PROPOSALS

TO THE ROCHESTER AQUEDUCT AND WATER COMPANY FOR FURNISHING COATED CAST-IRON WATER PIPES AND SPECIAL CASTINGS.

Made by ——— ———.
Residing in ———.
Dated June ——, 1885.

Do hereby declare that —— —— is the only person interested in this proposal, and that no other person than the person within named has any interest in this proposal or in any contract proposed to be taken; that it is made without any connection with any other person or persons making proposals for the same kind of work, and is in all respects fair and without collusion or fraud.

And I do hereby declare that I have carefully examined the annexed specifications and form of contract and the plans, and I will contract to furnish the pipes and special castings of the dimensions, in the manner and on the conditions required, upon the following items, viz. :—

For all 12 inch straight pipe, class A, per ton of 2240 lbs., the sum of ——.
For all 12 inch straight pipe, class B, per ton of 2240 lbs., the sum of ——.
For all 12 inch straight pipe, class C, per ton of 2240 lbs., the sum of ——.
For all 10 inch straight pipe, class C, per ton of 2240 lbs., the sum of ——.
For all 8 inch straight pipe, class C, per ton of 2240 lbs., the sum of ——.
For all 6 inch straight pipe, class C, per ton of 2240 lbs., the sum of ——.
For all special castings, per ton of 2240 lbs., the sum of ——.

(Signed) —— ——,
(Residing) ——,
——.

KNOW ALL MEN BY THESE PRESENTS.

That we, —— ——, of ——, as principal and —— ——, as surety, are held and firmly bound unto the Rochester Aqueduct and Water Company, in the sum of three thousand dollars ($3,000.00), lawful money of the United States of America, to be paid to the Company or its certain Attorney, its successors and assigns, for which payment will and truly be made, we bind ourselves, our heirs, executors, and administrators, jointly and severally, firmly by these presents.

Sealed with our seals, and dated the first day of July, in the year one thousand eight hundred and eighty-five.

Whereas, the said —— —— has made a proposal to the Rochester Aqueduct and Water Company and contracted, by contract bearing date the first day of July, one thousand eight hundred and eighty-five, for furnishing cast-iron water pipes for the Rochester Aqueduct and Water Company, a corporation duly existing under the laws of the state of New Hampshire, and having its place of business in Rochester, New Hampshire.

Now the condition of this obligation is such that if the said —— —— shall well and truly carry out the contract on his part to be performed according to the true intent of the same, then this obligation shall be of no effect; otherwise it shall remain in full effect and virtue.

—— ——, [L. S.]
—— ——, [L. S.]
—— ——. [L. S.]

Signed and sealed in the presence of
—— ——.

SPECIFICATIONS.

I.—WORK TO BE DONE.

The work to be done consists in furnishing at Portsmouth, N. H., as shall be designated by the engineer, the following pipes and castings free aboard cars of the Boston & Maine Railroad at Portsmouth, New Hampshire.

107 tons of 12 inch pipe, class A,	163 tons of 12 inch pipe, class B,
435 " " 12 " " " C,	158 " " 10 " " " C,
56 " " 8 " " " C,	200 " " 6 " " " C,

and 30 tons of special castings, more or less, as may be required with the above pipes, consisting of branches, bends, reducers, bevel hubs, cuned pipes, sleeves, and all or any other special castings directed by the engineer in this connection, subject to all the conditions and requirements of this contract and specifications. The above weight of the various diameters and classes of pipes are to be considered as approximate only. The engineer shall have the right of increasing or diminishing the same, as may be necessary, not exceeding twenty per cent of the quantities.

2.—WHERE DELIVERED.

All pipes and other castings shall be delivered at Portsmouth, New Hampshire, free aboard cars of the B. & M. Railroad within reach of vessel's tackle.

3.—MARKING.

Every pipe and special casting shall have distinctly cast upon it the initials of the maker's name, and the year in which it was cast; also the number signifying the order in point of time in which it was cast; the figures denoting the year being above and the numbers below, thus :—

1885 1885 1885
1 2 3

etc., and also the class letter; the letter and the figures to be cast upon the outside, not less than two inches in length, and one eighth of an inch in relief.

4.—APPARATUS FOR WEIGHING PIPES.

The contractor shall also provide at his own expense, at the foundry where the castings are made, properly sealed scales and weights for weighing the pipes and special castings, which weighing shall be done at the expense of the contractor, under the supervision of the engineer or some person delegated by him, and the weight of each pipe or special casting shall be conspicuously painted in white on the outside or inside before delivery, said pipe or casting being subject to reweighing by engineer at Portsmouth, N. H.

5.—DESCRIPTION OF PIPES.

The pipes shall be made with hub and spigot joints, which shall accurately conform in shape and dimension to the drawing furnished.

6.—SECTIONS, ETC.

They shall be true circles in section, with their inner and outer surfaces concentric.

7.—STRAIGHT AND CURVED PIPE.

The straight pipes shall be straight, and the curved pipes shall be true to the required curvature in the direction of their axes.

8.—DIMENSIONS.

They shall be of specified dimensions in internal diameter from end to end, and the straight pipe shall be twelve feet in length, exclusive of socket.

9.—SIZE OF SOCKET, ETC.

Especial care shall be taken to have the sockets of the required size. The sockets and spigots will be tested by circular gauges, and no pipe will be received which is defective in joint-room from any cause. The joint-room for each class of pipe is shown in the table marked "Joint-room, Weight, etc."

10.—SPECIAL CASTINGS.

All special castings shall be made according to such drawings and instructions as will be given by the engineer from time to time. They shall have lugs cast on them of such forms and of such numbers as may be directed.

11.—JOINT-ROOM, WEIGHT, ETC.

Diameter of Pipe.	Thickness of Joint for Calking.	Length of Pipe 12 feet exclusive of Socket.		
		Class A. Weight.	Class B. Weight.	Class C. Weight.
16 inches	0.5 inch	....	....	....
12 inches	0.4 inch	786	826	885
10 inches	0.4 inch	....	....	682
8 inches	0.4 inch	....	....	502
6 inches	0.4 inch	....	....	345

12.—MAXIMUM VARIATION.

No pipe will be accepted which falls short of the standard weight above specified by more than four per cent thereof, and no excess of weight in any one pipe of more than four per cent over the above specified standard will be paid for.

The castings furnished under such items shall be weighed after delivery at Portsmouth, and the total weight so ascertained shall be paid for, provided it is not more than two per cent greater than the sum of the standard weights herein stated for the same prices, and provided no excess greater than four per cent on any one piece shall be paid for.

13.—QUALITY OF IRON.

The metal shall be made without any admixture of cinder iron or other inferior metal, and shall be remelted in a cupola or air furnace. It shall be of such quality as to make a pipe strong, tough, and of even grain, and as hard as will satisfactorily admit of drilling and cutting, and shall possess a tensile strength of at least sixteen thousand pounds per square inch.

14.—SPECIMEN RODS.

Specimen rods of the metal used, of a size and form suitable for a testing machine, shall be prepared for the engineer when required.

15.—HOW TAKEN.

These specimen rods shall be poured from the ladle at any time, either before or after the pipe has been poured, as may be required, and shall represent a true specimen of the iron used in making the pipes.

16.—HOW CAST.

The straight pipes shall be cast in dry sand molds in a vertical position, with the hub end down, and the curved pipes in loam.

17.—FLASKS NOT TO BE REMOVED.

The flasks of all pipes shall be allowed to remain in position a sufficient length of time to prevent unequal contraction.

18.—QUALITY OF COATINGS.

The pipes and castings shall be free from scales and defects of every nature, no plugging or filling will be allowed, they shall be thoroughly cleaned, and no lumps or rough places shall be left in the barrels or sockets nor on the outer surface at the spigot ends. No acid shall be used in cleaning any of the castings.

19.—INSPECTION, CLEANING, AND COATING.

All pipes and special castings, of whatever form, shall pass a careful hammer inspection, and having been cleaned under the direction and to the satisfaction of the engineer, shall be carefully coated inside and out with coal pitch varnish according to the Dr. Angus Smith process.

20.—CONDITION OF THE SURFACE BEFORE COATING.

The surface must be entirely free from rust, and no casting shall be coated unless examined and approved by the engineer immediately before the process begins, if he shall so elect, as to the cleaning and condition of the surfaces. The contractor shall provide a covered tramway from the casting-room to the dipping-vat, so that no casting shall be liable to become wet previous to its being coated.

21.—HOW APPLIED.

The coating shall be applied under the following conditions :—

22.—THE PITCH.

The coal pitch varnish used must be of a character to make a smooth coating, tough and tenacious when cold, and not brittle nor with any tendency to scale off.

23. Each casting shall be heated to a temperature of three hundred degrees, Fahrenheit, immediately before it is dipped, and shall possess not less than this temperature at the time it is put in the bath. Each casting shall remain in the bath at least thirty minutes.

24. The pitch shall be heated to a temperature of three hundred degrees Fahrenheit, or less if the engineer shall require it so, and it shall be maintained at that temperature during the time that the casting is immersed.

25. Fresh pitch and linseed oil shall be frequently added to keep the mixture at the proper consistency, and the vessel shall be occasionally emptied of its contents and refilled with fresh pitch.

26. Any pipe or special casting that is to be recoated shall first be thoroughly scraped and cleaned.

27. After being coated the pipes shall be carefully drained of the surplus pitch, and, when dry and cool, shall be subject to a proof by water pressure of three hundred pounds to the square inch, and if required by the engineer they shall be subjected to a careful hammer test while under the pressure. They shall be subjected to proof by water pressure and hammer test, or either, after their delivery, if so required by the engineer.

28. All tools, materials, and men necessary for the proper tests and inspection of the castings shall be furnished by and at the expense of the contractor.

29. The castings will be weighed for payment after the application of the coal pitch coating, and if so desired by the engineer, they shall be weighed after the delivery, and the weights so ascertained shall be used in the final settlement of this contract.

30. The engineer shall be at liberty at all times to inspect the material at the foundry, and the molding, casting, and coating there. The forms, sizes, uniformity, and conditions of all pipes and other castings herein referred to, shall be subject to his inspection and approval, and he may reject without proving any casting which is not in accordance with the specifications or drawings furnished. He shall have the power to prevent the use of any metal, mold, or core which, in his opinion, is not suitable for the purpose for which it was intended.

(*a.*) The application of the coal pitch shall be made to his satisfaction, and the material shall at all times be subject to his inspection and rejection.

(*b.*) He shall have the right to make any alteration in the plan, form, or dimensions of the special castings herein mentioned.

31.—INSPECTION, ETC.

All the pipes and other castings contracted for must be delivered in all respects sound and conformable to the contract. The inspection will not relieve the contractor of any of his obligations in this respect, and any defective pipe or other casting which may have passed the inspector at the works or elsewhere will be at all times liable to rejection when discovered, until the final adjustment and completion of this contract.

32.—SHIPMENT AND DELIVERY.

The shipment of the pipes shall commence in July, 1885, and be continued regularly as follows: Cargoes in the latter part of the months of July, August, and September, 1885, to be delivered on board the cars at Portsmouth, N. H., along the wharf within reach of tackle. Special castings are to be delivered as may be required by the engineer. The rate of delivery of the different sizes shall be varied as required by the engineer.

33.—THE GROSS TON.

The ton used shall be the gross ton of twenty-two hundred and forty pounds (2,240 lbs.).

34.—MEANING OF THE SPECIFICATIONS.

Any doubt as to the meaning of these specifications, or any obscurity as to the wording of them, will be construed by the engineer, who shall have the right to correct any errors or omissions in them necessary for the proper fulfillment of their intention, the action of such correction to date from the time that the engineer gives due notice thereof.

35.—"ENGINEER."

Whenever the word "Engineer" is used herein it shall be understood to refer to the engineer of the said Rochester Aqueduct and Water Company, and to his properly authorized agents, limited by the particular duties intrusted to them.

36.—"CONTRACTOR."

Whenever the word "Contractor" is used herein it shall be understood to refer to the party or parties contracting to furnish the materials and perform the work to be done under these specifications, or the legal representatives of such party or parties.

On condition of the faithful performance of this agreement and these specifications, the party of the first part agrees to pay to the party of the second part at the rate of

$—— for all 12 inch pipe, class A,
$—— " 12 inch pipe, class B,
$—— " 12 inch pipe, class C,
$—— for all 10 inch pipe, class C,
$—— " 8 inch pipe, class C,
$—— " 6 inch pipe, class C,

per gross ton of 2,240 lbs., at the rate of —— dollars per ton of 2,240 lbs., for the special castings; all of said pipes and castings to be coated by the Dr. Angus Smith patent process; said coating to be perfected at the foundry, and in accordance with the specifications herein named, and the prices per ton above mentioned to include the coating of said pipes and castings, and all labor and expenses attending the proving of said pipes and castings at the foundry, except the per diem of the inspector, appointed by the R. A. & W. Company, to be met and paid by the party of the second part.

Payments to be made monthly on the weight of the said castings received in proper order and condition, according to the certificate of the engineer, reserving ten per cent until the satisfactory completion of the contract; provided, that nothing herein contained shall be construed to affect the right, hereby reserved, of the said R. A. & W. Company to reject the whole or any portion of the aforesaid pipes and castings, should the said certificate be found or known to be inconsistent with the terms of the agreement, or otherwise improperly given.

That the conditions of this contract, as regards the continuous delivery, may not be misunderstood, it is hereby agreed that this contract may, at the option of the said party of the first part, be declared and considered forfeited, if, on or before the 6th day of August next, there should not have been delivered in good condition in terms of these specifications, at least one third of the pipes, and at least one third of the special castings herein contracted for.

And the said party of the second part agrees that he will execute a bond, in such sum and in such securities as shall be approved by the R. A. & W. Company, for the faithful performance of this contract, conditioned to indemnify and save harmless the town and the said company, or any member thereof, on account of any injury or damage received or sustained by any person or persons, by or from said party of the second part or his agents or servants in the fulfillment of this contract, or by or on account of any act or omission of the said party of the second part, or his agents or servants, or by any failure to deliver the castings in the manner and at the time herein before agreed upon, and for the faithful performance of this contract by the party of the second part; and the said party of the second part hereby further agrees that so much of the money due to him under and by virtue of this agreement, as shall be considered necessary by the R. A. & W. Company, may be retained by the party of the first part until all such suits for claims, or damages as aforesaid, shall have been settled, and evidence to that effect furnished to the satisfaction of the said company.

If, under the process of inspection, there shall have been rejected, under the conditions of this contract and specifications, during any forty days continuously of its limitation, thirty-three per cent of the pipes and castings offered within that time for acceptance, the contract may, at the option of the party of the first part, be declared forfeited, and it shall be forfeited accordingly.

In case of forfeiture of this contract under any of the circumstances above mentioned, or in consequence of failure to perform other obligations and conditions of this contract, notice shall be given to the said party of the second part, and the contract and agreement shall then become null and void, and the said party of the first part may at its discretion contract with other parties for all or any part of the work left uncompleted by the party of the second part, and the said party of the second part shall be liable to any damages caused to said R. A. &. W. Company by reason of such failure.

All materials of whatever description, upon which advances have been made, shall become thereby, so far as acceptable in other respects, the exclusive property of the said party of the first part; and whatever may be found, after delivery, objectionable in castings upon which advances have been made, the party of the second part shall make good and replace immediately on receiving notice thereof; and if said defective and objectionable materials are not replaced within thirty days after the delivery of said notice to the said party of the second part at their office or place of business, the said party of the first part may obtain of other parties, at their discretion, the articles or pipes rejected under the terms of this agreement, and the cost and expense of replacing such rejected castings by sound and unobjectionable ones shall be paid by the party of the second part, or deducted from any balance due or which may become due to the said party of the second part by the said party of the first part.

It is hereby understood that, with the exception of such instructions and corrections as the engineer under the provisions of this contract is entitled to make, the terms and conditions of this contract, or any one of them, cannot be dispensed with, or rendered in any sense null and void without the written consent of the party of the first part attached to or indorsed upon this agreement, specifying what modifications may have been agreed upon.

It is hereby agreed that the contractor shall pay and discharge all workmen's and mechanics' liens, and other liens and claims for work and labor done, or materials in the construction of said pipe, and shall indemnify and save the company harmless from and against all and singular the same, and shall furnish the said company with satisfactory evidence when called for by them, that all persons who have done work or furnished materials in the construction of said pipes, have been fully paid for or satisfactorily secured; and in case such evidence is not furnished, an amount necessary and sufficient to meet the claims of all persons aforesaid shall be retained from the moneys due the said contractor under this contract, until the liabilities aforesaid shall be fully discharged or satisfactorily secured.

It is hereby further agreed that this contract shall not be subject or assigned to any other party or parties without the written consent of the party of the first part indorsed thereon.

In Witness Whereof the Party of the first part has caused these presents to be signed and sealed by a committee for the purpose duly authorized, and the said party of the second part has hereunto set his hand and seal this day and the year first above written.

The Rochester Aqueduct and Water Company, by its committee.

——— ———, [L. S.]
EBENEZER G. WALLACE, [L. S.]
CHARLES B. GAFNEY. [L. S.]

Signed, sealed, and delivered in duplicate before us,

——— ———, [L. S.]
——— ———. [L. S.]

Signed and sealed in the presence of

WM. T. SULLIVAN. [L. S.]

OFFICE OF THE ROCHESTER AQUEDUCT
AND WATER COMPANY.

ROCHESTER, N. H., ——, 1885.

To Contractors :—

Sealed proposals will be received at this office until 12 o'clock ———, 1885, for laying cast-iron water pipe. The engineer's estimate for the work to be done is as follows :—

20,000	feet	12	inch	water	pipe.
1,000	"	10	"	"	"
4,000	"	8	"	"	"
17,000	"	6	"	"	"

These quantities are considered approximate, and the company reserve the right to increase or diminish the same, as in their opinion may be necessary.

Proposals will also be received at the same time and place for constructing dams and other necessary works at the company's reservoir, also for the construction of a canal to said reservoir, all of said work to be done according to the plans, specifications, and contract, to be shown bidders at this office.

Each bid is to be signed by the bidder, and accompanied by a certified check of five hundred ($500) dollars, payable to the order of Albert Wallace, treasurer of the said company, as security for the execution of the contract.

Bidders will state the price in their proposal for each and every separate item of the work. The prices proposed will cover the expense of all material, tools, and labor, except pipes, special castings, gates, and hydrants, which will be furnished on cars at Rochester, N. H. Lines and locations on the grounds will be shown contractors on application to the engineer at this office. Forms of proposals, plans, and specifications, etc., may be seen at this office.

The company reserve the right to reject, in whole or in part, any and all bids.

ROCHESTER AQUEDUCT AND WATER COMPANY.

J. A. FARRINGTON, *Engineer.*

PROPOSAL.

To the ——— for excavating and back-filling trenches, and hauling and laying water pipe, and putting in place stop-gates and other appurtenances.

Made by —— ——, residing in ———, do declare that —— ——, the only person interested in this proposal, and that no other person than the person herein named, ha any interest in this proposal, or in any contract proposed to be taken; that it is made without any connection with any other persons making proposals for the same work, and is in all respects fair and is without collusion or fraud.

And — do further declare that no person appointed to any office by virtue of any ordinance or order of said town, or in any act of the legislature relating to the supplying of water to said town, is in any way directly or indirectly interested therein, or in the supplies or works to which it relates, or in any portion of the profits thereof.

And — do further declare that — ha carefully examined the annexed specifications and form of contract, and the plans and — will contract to do the work and furnish the materials called for by the annexed contract and specifications in the manner and on the conditions required upon the following terms, to wit:—

1. For all excavations of trenches or foundations in rock and disposing of the materials, in spoil banks, the sum of

2. For all trenching and back-filling in earth and disposing of the materials:

For 12 inch pipe, the sum of — cents per lineal foot.
For 10 inch pipe, the sum of — cents per lineal foot.
For 8 inch pipe, the sum of — cents per lineal foot.
For 6 inch pipe, the sum of — cents per lineal foot.

3. For all labor and expense of passing under railroad tracks the sum of — for each crossing.

4. For laying the pipes and all appurtenances, furnishing all materials, and doing all labor incidental thereto, not excepted in the specifications, the lengths to be measured along the center of the pipes, and in case of branches, as starting from the center of the main pipe:

For 12 inch pipe, with lead and gasket joint, the sum of — cents per lineal foot.
For 10 inch pipe, with lead and gasket joint, the sum of — cents per lineal foot.
For 8 inch pipe, with lead and gasket joint, the sum of — cents per lineal foot.
For 6 inch pipe, with lead and gasket joint, the sum of — cents per lineal foot.

5. For all concrete masonry laid as specified, including the furnishing of all materials and forms, the sum of —— per cubic yard.

6. For all brick masonry laid in hydraulic cement mortar, as specified, including the furnishing of all materials and forms and setting of all manhole heads and covers, the sum of —— per cubic yard.

7. For hauling and setting all hydrants complete, including connections with the main pipe, and all and every charge for the same, the sum of —— for each hydrant.

8. For furnishing and setting all wooden stop-gates, air-cock, valve, and manhole boxes, including fitting and placing covers, the sum of —— each.

9. For furnishing and securing in place all wrought-iron work, the sum of — cents per pound.

The above prices are to include the cost of doing all other work required by the specifications or appertaining thereto, including the setting of stop-gates.

In case this proposal be accepted by the said company, —— ——, of the county of ———, in the state of ———, and —— ——, of the county of ———, in the state of ———, both responsible parties, are offered as sureties for the faithful performance of the contract therefor.

(Signed.)

This agreement, made and concluded this twenty-first day of July, in the year one thousand eight hundred and eighty-five, by and between the Rochester Aqueduct and Water Company, a corporation existing under the laws of the state of New Hampshire and having its place of business at Rochester, in the county of Strafford and state of New Hampshire, party of the first part, and —— —— and —— ——, of ———, in the county of ———, in the state of ———, copartners, doing business under the firm name of ———, party of the second part.

Witnesseth, that the said party of the second part, for a full and valuable consideration, have agreed, and by these presents do agree, with the party of the first part, and under a penalty expressed in a bond bearing even date with these presents, and hereunto annexed, at their own proper cost and expense, in a good and workmanlike manner and according to the best of their art and ability, to do all work and furnish all materials called for by this agreement, in the manner and under the conditions herein specified, and in accordance with the plans and directions made and to be made from time to time as the work proceeds; and have further agreed that the said Rochester Aqueduct and Water Company shall be and are hereby authorized to appoint, from time to time, such persons as they deem proper to inspect the materials to be furnished and the work to be done under this agreement, and to see that the same strictly corresponds with the specifications hereinafter set forth.

To prevent disputes and litigation, it is further agreed by and between the parties of this contract, that the engineer shall, in all cases, determine the amount or the quantity of the several kinds of work which are to be paid for under this contract; and he shall decide all questions which may arise relative to the execution of this contract on the part of the contractor, and his estimate shall be final and conclusive.

SPECIFICATIONS.

1.—WORK TO BE DONE.

All the pipes, special castings appertaining thereto, stop-gates, air-cocks, check-valves and hydrants, will be furnished to the contractor and delivered at Portsmouth, N. H., or Rochester, N. H., on cars subject to weight and inspection. The cost of hauling after such delivery, and all expenses for labor, materials, tools, etc., incurred in laying the pipes, shall be paid by the contractor, except freight from Portsmouth to Rochester, to be paid by company on presentment of railroad freight bill by contractor.

2.—MEASUREMENTS FOR PAYMENTS.

The measurements for payments will be made along the center of the pipe after it is laid, and in case of branches, as starting from the center of the main pipe. No allowance will be made for special castings, gates, or cut-pipes, nor in consequence of any variation of the castings from the drawings or plans, for extra quantity of lead or gasket, nor on any other account.

3.—LOCALITY.

The above work is to be done in the town of Rochester, N. H., aforesaid, in the streets and along the line indicated by the engineer.

4.—TRENCHES.

The trenches for the pipes shall be opened in accordance with the lines and grades given for the work and as far in advance of the pipes as may be required by the engineer, but in no case farther. The top of the pipe shall be five feet below such grade as the engineer shall determine to be the established grade of the center line of the street, whether the same is the present grade of the street or not; but upon other than street lines the top of the pipe shall be at least three feet below the surface of the ground, and always indicated by the engineer. The contractor shall make additional excavations whenever required for the purpose of securing a good foundation, and shall refill with suitable material in the manner required. The width of such trenches shall be at least two feet greater than the diameter of the pipe to be laid therein. In the earth excavation all necessary joint holes shall be dug at least one foot below the bottom of the bell or hub of the pipe, by two and one half feet wide, and four feet long, to give sufficient room for calking.

Where water occurs in the bottom of the trench, it shall be sufficiently drawn off to obtain a firm basis for the pipes, and to admit of the calking being sufficiently performed. The gravel, macadamizing, and other surface material, for at least one foot in depth, shall be carefully taken off and deposited on one side of the trench. The remaining excavation shall be put on the other side of the trench, to avoid waste, and all material to be kept two feet from the edges of the trench.

5.—ROCK.

In rock, the material shall be taken out to a depth of six inches below the bottom of the pipe, and of a width two feet greater than the inside diameter of the pipe, the lower six inches in depth of the trench to be refilled with suitable gravel and thoroughly tamped before laying the pipe, in order to give it a firm basis. All the excavations shall, after the laying and calking of the pipe, be refilled in layers of six inches in depth, and properly tamped with earth not required for filling other trenches, or in case such material is not to be had, then with suitable material to be furnished by the contractor at his own expense and cost.

The above dimensions will be taken for estimating the amount of rock excavation, and no allowance will be made for greater widths or depths, nor for sloping sides, nor for such refilling. Only such stone as requires blasting, and is found in quantities of one cubic yard or more, will be estimated as rock.

6.—PROTECTION OF TRENCHES.

Measures shall always be taken by the contractor to insure the safety of the public while the trenches are open, by such precautions of shoring, watching, barriers, lights, covering blasts, etc., as the case may call for.

7.—SHEETING.

In cases where it is necessary to prevent the caving in of the banks, the contractor shall, at his own cost and expense, furnish and put in suitable bracing material, and remove the same as the filling of the trenches proceeds.

8.—DELIVERY OF THE PIPES ALONG THE STREETS, ETC.

In delivering the pipes and castings along the streets and line, care shall be taken to distribute them in the order in which they are to be laid, and so place them as to interrupt the use of the street as little as possible.

9.—TOOLS.

Proper implements and tools for the safe and convenient handling and laying of the pipes, etc., such as are satisfactory to the engineer, shall in all cases be used, and great care shall be taken in all cases in the handling of the pipes to prevent the pitch from being rubbed off.

The contractor will be held responsible for all damage and injury that may occur to the pipes or other articles after their delivery to him.

10.—DEFECTIVE PIPES.

No pipe or casting shall be laid which is known or may be found to be defective, or which has been injured by handling. Notice shall always be given to the engineer or inspector of any such injured or defective casting, and it shall be set aside and conspicuously marked with the letter "D" in white paint, whether detected at the yard or after delivery along the line.

If any defective pipe or casting shall be found to have been laid, it shall be removed and replaced by a sound and unobjectionable pipe or casting by the contractor without extra charge.

11.—CONCRETE FOUNDATIONS.

At such points as the engineer may require, a concrete foundation shall be put in to support the pipes and other work.

12.—STAY WALLS.

On steep grades, where required, masonry stay walls of such form and dimensions as the engineer may direct shall be built at the expense of the contractor.

13.—LAYING OF PIPES.

The pipes, when laid in the trenches, shall accurately conform to the alignment and grades required, and on curves, the pipes designed for that particular curvature shall be used, and no other. Stop-gates, air-cocks, hydrants, special castings,and all other parts pertinent to the supply or distribution shall be set or laid at the required points in such a manner as the engineer may direct. Whenever the pipes require cutting, the work shall be done under the direction of the engineer.

14.—CAPS TO BE SECURED.

The reducers, bends, and such other parts as may be liable to draw, shall be firmly secured by straps, bolts, or masonry, as directed by the engineer, and the caps of such branches as require to be capped shall be bolted or supported by masonry and well secured, and all other applications as may be necessary to the perfect working of the distribution, when the water is let on, shall be made and completed.

15.—STRAPS AND BOLTS.

The straps and bolts used shall be made of the best American refined iron, and the size and workmanship, as well as the material, shall in all respects be satisfactory to the engineer.

16.—OMISSIONS.

Any omissions of branches, stop-gates, or other appurtenances intended to be laid, shall be corrected when required, by reopening the trench, if it has been filled up, and introducing what has been omitted without extra charge.

17.—JOINT-ROOM.

At the time when laid, the spigots of the pipe shall be so adjusted in the sockets as to give a uniform space all around, and if any pipe does not allow sufficient space, it shall be replaced by one of proper dimensions.

The joint shall at all times be at least three eighths of an inch in thickness.

The depth of lead shall be as follows: For 12-inch pipe, 2¼ inches; 10-inch, 2¼ inches; 8-inch, 2 inches; 6-inch, 2 inches.

18.—SPACE BETWEEN JOINTS.

The joints of the sleeves shall be run with lead to a depth of not less than the joints of the pipes upon which they shall be placed, and as much deeper as may be required by the engineer.

The gasket packing shall be of clean, sound, hemp yarn, twisted or braided, applied in one piece and tightly driven, so as to leave the required depth for the lead, which must not be poured until the inspector has pronounced the packing and depth satisfactory. The pipes shall be separated such a distance between the end of the spigot and the shoulder of the socket as may be required by the engineer.

19.—LEAD.

The lead used shall be of the best quality of pure soft lead, and suitable for calking and securing a tight and permanent joint.

20.—RUNNING JOINTS.

Before running the lead the joints shall be carefully wiped out to make them clean and dry; the joint shall be run full at one pouring, and the melting-pot shall always be kept within 30 feet of the joint about to be poured.

21.—CALKING.

The joints shall be calked by competent mechanics, the calking to be faithfully executed, and in such a manner as to secure a tight joint without overstraining the iron of the bell. In all cases the calking shall be done towards the place of the gate and other points where the lead is likely to be porous, so as to drive it together at these points. The lead, after being driven, shall be flush with the face of the socket.

22.—CLEANING CASTINGS.

The pipes and all other castings shall be carefully swept and cleaned, as they are laid, of any earth or rubbish which may have found place inside during or before the operation of laying. Every open end of a pipe or branch shall be plugged or otherwise closed whenever work is suspended.

23.—FILLING TRENCHES.

In refilling trenches, the earth filled into the bottom of the trench, under and at the top of the pipe and other castings, shall be carefully packed and well rammed with proper tools for the purpose. Care shall be taken to give the pipe a solid bearing throughout its entire length. The earth filling above the pipe shall also be sufficiently rammed to prevent after settlement. It shall be moistened, when necessary, by the engineer, and the material must be free from stones over six inches in diameter.

The trenches shall in all cases be refilled with the material furnished by their excavation, provided it be proper quality; and in case such material is lacking, it shall be supplied by the contractor without extra charge. No pipe shall be covered until special orders to that effect have been given.

24.—STREETS AND SIDEWALKS TO BE KEPT OPEN.

The contractor shall keep the streets in which he may be at work open for carriages to pass, as far as practicable; he shall bridge the trenches at all crossings of streets and private ways, and shall conduct his work for this object in such manner as directed by the engineer from time to time. No sidewalk shall be obstructed when it is possible to prevent it.

25.—CONDITION OF SURFACE OF STREET.

In streets and roads the class of surface before existing shall be replaced so as to be in every way equal to that surface in materials and workmanship, and satisfactory to the engineer.

26.—GATE-BOXES.

A box or vault, of wood or iron, shall be furnished, and set over each of the stop-gates, and over each of the air-cocks and check-valves, and the iron frames and covers shall be properly fastened to them. These boxes are to be made of the form and dimensions as shown on plans furnished by the engineer. If of wood, they shall be made of sound spruce lumber, which shall be bumetized or creosoted by the best approved process. If of wood, the boxes shall be formed of two-inch planks, set close and securely nailed.

27.—BLOW-OFF WELLS.

Wells shall be built to receive the water from the blow-off cocks when required. They shall be built where required by the engineer, of brick on foundations of concrete, and shall be provided with a manhole entrance, fitted with an iron frame, and covered according to the plans to be furnished. A pipe of suitable size will be laid from the blow-off to the well, and when necessary, the well shall be connected with the sewer or an open lot, in such a manner as may be directed by the engineer, and the price per yard for mason-work will include the cost of hauling and setting any such pipe, etc., as may be required for the purpose for which the wells are built.

28.—BRICK MASONRY.

The brick masonry shall be of the best quality of hard burnt bricks, laid in hydraulic mortar, the bricks to be thoroughly wet immediately before being laid, and be laid with full cement joints formed at one operation; the mortar to be of the best quality of fresh hydraulic cement and clean, sharp sand in the proportion of one part of cement and two parts of sand, and to be fresh mixed when laid.

29.—CONCRETE.

Concrete shall be made of broken stone, broken so as to pass through a ring two inches in diameter inside, mixed with cement mortar made as above described, in such proportions that it shall slightly overfill the void spaces in the stone. The stone used for this purpose shall be hard and durable, and if necessary, shall be washed. The concrete shall be laid in layers not exceeding six inches in thickness, and shall be well rammed until consolidated.

30.—GAS PIPE.

In laying the pipes, care shall be taken not to remove, without the consent of the proper parties, any gas pipe or fixtures, and in crossing these, they shall be sustained until the work is completed. The earth shall be filled in afterwards under and around them, so as to render their position as safe and permanent as before. Any damage done to gas pipes, or any other pipes, etc., or caused by neglect to attend to them, shall be paid for by the contractor.

31.—RAILROADS.

Whenever it may be necessary to interfere with any railroads, notice shall be given to the superintendent thereof, and reasonable time be given to remove or shore up the tracks, all of which cost shall be paid by the contractor.

32.—DEPOSIT OF MATERIALS.

The material from the trenches shall be so deposited as to interfere as little as possible with public transit or the convenience of the residents along the road or street.

33.—CISTERNS, DRAINS, SEWERS, ETC.

Whenever it may be necessary to cross or to interfere with existing drains, sewers, cisterns, or pipes, notice shall be given to the engineer, and the crossings or alterations shall be made according to his directions, and the contractor shall have no claims for any extra compensation on account of any increase in the depth of laying pipe by reason of such drains, cisterns, sewers, etc., or on account of any difficulty or expense occasioned by the same. Any damage caused to the mason-work of the drains, cisterns, sewers, or pipes shall be thoroughly repaired by the contractor, and the said mason-work shall be strengthened, if necessary, to meet any additional strain that the laying of the pipes may impose upon it.

34.—CLEANING STREETS.

Any defective pipes or other pipes not laid, castings or other iron works, [illegible]s, shall be removed from the streets and deposited in the pipe-yard or at other such points in the town as may be directed by the engineer. As the laying is completed, all rubbish or refuse of whatever description created thereby shall be removed without unnecessary delay from the street or road, which shall be left in all respects in as good a state as existed before the laying commenced. Whenever this cleaning of rubbish from the street is neglected, the engineer will give notice to that effect to the contractor, and if said rubbish is not removed or said repairing is not done within one day thereafter, the engineer may employ other parties to do such work at the expense of the contractor, and the expense thus incurred shall be deducted from any money due the contractor.

35.—CORRECTING IMPERFECT WORK.

Any imperfect or unfaithful work that may be discovered before the final acceptance of the work shall be corrected immediately on the requirement of the engineer, notwithstanding that it may have been overlooked by the proper inspector and estimated. The inspection of the work shall not relieve the contractor of any obligation to perform sound and reliable work as herein described.

36.—INCOMPETENT MEN TO BE DISCHARGED.

If any person employed by the contractor shall appear to the engineer to incompetent or disorderly, he shall be discharged immediately upon the requi tion of the engineer, and such person shall not again be employed upon works.

37.—ORDERS.

Whenever the contractor is not present upon any part of the work where it may be desired to give directions, orders may be given by the engineer, and shall be received and obeyed by the superintendent or foreman in charge of the particular work in reference to which the orders are given.

38.—WORK TO BE KEPT IN REPAIR SIX MONTHS.

The contractor shall keep the work in good repair for the term of six months after the date that the water is let into the pipes for the purpose contemplated in building said works, and shall correct and repair promptly during all that time all the leaks and failures of whatever description, and all settlements and irregularities of surfaces of streets, the work, in all respects, to be in good condition at that time.

39.—STAKES AND BENCH-MARKS.

All grades, dimensions, locations, and heights of the different kinds of work will be given by the proper stakes and bench-marks. Such stakes and bench-marks must be preserved by the contractor until the prosecution of the work requires their removal. If the contractor, in a willful and careless manner, remove, or causes the removal of any stakes or bench-marks before the prosecution of the work requires it, the expense of replacing them will be charged to the contractor, and the amount deducted from the amount due on his final settlement.

40.—INSPECTION.

All of the work contemplated and described in this contract and specifications shall be done to the satisfaction of the engineer, and all the materials and workmanship of whatever description shall be subjected to the inspection and rejection of said engineer.

41.—EXPLANATIONS AND CORRECTIONS.

Any doubt as to the meaning of these specifications or any obscurity in the wording of them, shall be explained by the engineer, who shall have the right of correcting any errors or omissions in them when such correction is necessary for the proper fulfillment of their intentions, the action of such intention to date rom the time that the engineer gives notice thereof.

42.—ENGINEER.

Whenever the word "Engineer" is used herein, it shall be understood to efer to the engineer of the Rochester Aqueduct and Water Company and o his properly authorized agents, limited to the particular duties intrusted to hem.

32.—DEPOSIT OF MATERIALS.

The material from the trenches shall be so deposited as to interfere as little as possible with public transit or the convenience of the residents along the road or street.

33.—CISTERNS, DRAINS, SEWERS, ETC.

Whenever it may be necessary to cross or to interfere with existing drains, sewers, cisterns, or pipes, notice shall be given to the engineer, and the crossings or alterations shall be made according to his directions, and the contractor shall have no claims for any extra compensation on account of any increase in the depth of laying pipe by reason of such drains, cisterns, sewers, etc., or on account of any difficulty or expense occasioned by the same. Any damage caused to the mason-work of the drains, cisterns, sewers, or pipes shall be thoroughly repaired by the contractor, and the said mason-work shall be strengthened, if necessary, to meet any additional strain that the laying of the pipes may impose upon it.

34.—CLEANING STREETS.

Any defective pipes or other pipes not laid, castings or other iron works, shall be removed from the streets and deposited in the pipe-yard or at other such points in the town as may be directed by the engineer. As the laying is completed, all rubbish or refuse of whatever description created thereby shall be removed without unnecessary delay from the street or road, which shall be left in all respects in as good a state as existed before the laying commenced. Whenever this cleaning of rubbish from the street is neglected, the engineer will give notice to that effect to the contractor, and if said rubbish is not removed or said repairing is not done within one day thereafter, the engineer may employ other parties to do such work at the expense of the contractor, and the expense thus incurred shall be deducted from any money due the contractor.

35.—CORRECTING IMPERFECT WORK.

Any imperfect or unfaithful work that may be discovered before the final acceptance of the work shall be corrected immediately on the requirement of the engineer, notwithstanding that it may have been overlooked by the proper inspector and estimated. The inspection of the work shall not relieve the contractor of any obligation to perform sound and reliable work as herein described.

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If any person employed by the contractor shall appear to the engineer to be incompetent or disorderly, he shall be discharged immediately upon the requisition of the engineer, and such person shall not again be employed upon the works.

37.—ORDERS.

Whenever the contractor is not present upon any part of the work where it may be desired to give directions, orders may be given by the engineer, and shall be received and obeyed by the superintendent or foreman in charge of the particular work in reference to which the orders are given.

38.—WORK TO BE KEPT IN REPAIR SIX MONTHS.

The contractor shall keep the work in good repair for the term of six months after the date that the water is let into the pipes for the purpose contemplated in building said works, and shall correct and repair promptly during all that time all the leaks and failures of whatever description, and all settlements and irregularities of surfaces of streets, the work, in all respects, to be in good condition at that time.

39.—STAKES AND BENCH-MARKS.

All grades, dimensions, locations, and heights of the different kinds of work will be given by the proper stakes and bench-marks. Such stakes and bench-marks must be preserved by the contractor until the prosecution of the work requires their removal. If the contractor, in a willful and careless manner, remove, or causes the removal of any stakes or bench-marks before the prosecution of the work requires it, the expense of replacing them will be charged to the contractor, and the amount deducted from the amount due on his final settlement.

40.—INSPECTION.

All of the work contemplated and described in this contract and specifications shall be done to the satisfaction of the engineer, and all the materials and workmanship of whatever description shall be subjected to the inspection and rejection of said engineer.

41.—EXPLANATIONS AND CORRECTIONS.

Any doubt as to the meaning of these specifications or any obscurity in the wording of them, shall be explained by the engineer, who shall have the right of correcting any errors or omissions in them when such correction is necessary for the proper fulfillment of their intentions, the action of such intention to date from the time that the engineer gives notice thereof.

42.—ENGINEER.

Whenever the word "Engineer" is used herein, it shall be understood to refer to the engineer of the Rochester Aqueduct and Water Company and to his properly authorized agents, limited to the particular duties intrusted to them.

43.—CONTRACTOR.

Whenever the word "Contractor" is used herein it shall be understood to refer to the party (or parties) who has entered into the contract to perform the work to be done under the specifications or the legal representatives of such party.

44.—TOWN ORDINANCES.

In all of the operations connected with the work herein specified, all the ordinances and laws controlling or limiting in any way the actions of those engaged on the works, or affecting the materials applied to them, must be respected and strictly adhered to.

(*d.*) And it is further agreed that the work shall be commenced and carried on at such points and in such order of preference, and at such times and seasons as may, from time to time, be directed by the engineer. The rate of progress in pipe-laying shall be made to conform to the delivery of the pipe by the founders.

(*e.*) And the said party of the second part hereby further agree that said party of the first part shall be, and is hereby authorized to retain out of the money payable to the said party of the second part, under this agreement, fifteen per cent on the amount of the contract, and to expend in the manner hereinafter provided for, in making such repairs on the line of said work as the engineer may deem necessary.

(*f.*) And it is further agreed that if, at any time during six months of the date of the final completion of the work contemplated in this contract, any part of said work shall in the opinion of the engineer require repairing, and the engineer shall notify said party of the second part, in person or by mail, to make the repairs so required, and if said party of the second part shall neglect to make such repairs to the satisfaction of the engineer within three days from the date of the service of such notice, then the said engineer shall have the right to employ such person or persons as he may deem proper to make the same, and said party of the first part shall pay the expenses thereof out of the sum retained for that purpose by the party of the first part, as before mentioned.

(*g.*) And the said party of the first part hereby agree upon the expiration of the said period of six months, provided the work shall at that time be in good order, that the said party of the second part shall be entitled to receive such part of the sum last aforesaid as may remain after the expense of making such repairs, in the manner aforesaid, shall have been paid therefrom.

The said party of the second part hereby further agree that they will give their personal attention to the fulfillment of the contract; and that they will not sublet the aforesaid work, but will keep the same under their control; and that they will not assign by power of attorney, or otherwise, any portion of said work, unless by and with consent of the Rochester Aqueduct and Water Company, to be signified by indorsement on this agreement.

The said party of the second part hereby further agree that they will commence laying the pipes as soon as notice in writing shall be given; to commence and to progress herewith so as to complete the whole contract in accordance with this agreement by the ——— ——— ——, and it is expressly understood that should the delivery of the pipes to the party of the second part be at any time from any cause delayed, the said Rochester Aqueduct and Water Company are authorized to extend the time for the completion of this contract, not exceeding nine months from the time herein fixed for its termination, and there shall be no claim for damages in consequence of such delay.

The said party of the second part further agree that if the work to be done under this agreement shall be abandoned, or if the contract shall be assigned by the party of the second part otherwise than as herein specified; or if at any time the engineer shall be of the opinion, and shall so certify in writing to the Rochester Aqueduct and Water Company, that the said work, or any part thereof, is unnecessarily or unreasonably delayed, or the said party of the second part are willfully violating any of the conditions or covenants of this contract, or are executing said contract in bad faith, the Rochester Aqueduct and Water Company shall have the power to notify the aforesaid party of the second part to discontinue said work, or such part thereof as the Rochester Aqueduct and Water Company may designate; and the said Rochester Aqueduct and Water Company shall thereupon have the power to place such or as many persons, and to obtain by purchase or hire such animals, carts, wagons, implements, and tools, as the engineer may deem necessary or advisable, to work and be used to complete the work herein described, or such part thereof as the engineer may deem necessary, and to use such materials as they may find upon the line of said work, and to procure such other material for the completion of the same, and to charge the expense of said labor and materials, animals, carts, wagons, implements, and tools to the party of the second part, and the expense so charged shall be deducted and paid by the party of the first part out of such money as may be either due or may become due at any time thereafter, to the party of the second part under and by virtue of this agreement or any part thereof; and in case such expense is less than the sum which would have been payable under this contract, if the same had been completed by the said party of the second part, the said party of the second part shall be entitled to receive the difference; and in case such expense shall exceed the last said sum, then the said party of the second part shall pay the amount of such excess to the party of the first part on notice from said Rochester Aqueduct and Water Company of the excess so due.

It is hereby agreed that the contractor shall indemnify and save the Rochester Aqueduct and Water Company harmless from and against all claims against the said Rochester Aqueduct and Water Company, under the laws of the state of New Hampshire, for labor done and materials furnished under this contract, and shall furnish the said Rochester Aqueduct and Water Company with satisfactory evidence, when called for by them, that all persons who have done work or furnished materials under this contract, for which the said Rochester Aqueduct and Water Company may become liable, have been fully paid or satisfactorily secured; and in case such evidence is not furnished, an amount necessary and sufficient to meet the claims of the persons aforesaid shall be retained from the moneys due the said contractor under this contract, until the liabilities aforesaid shall be fully discharged or satisfactorily secured.

And the said party of the second part further agree that they will indemnify and save harmless said Rochester Aqueduct and Water Company from all claims, demands, suits, and actions of every name and description, for or on account of any injuries or damages received or sustained by any party or parties in their persons or property, by or from the party of the second part, their servants, or agents in the construction of the said work, or by or in consequence of any improper materials used in its construction, or by or in consequence of any negligence in grading the same, or by or on account of any act or omission of the said party of the second part, or their agents, and at their own proper cost and expense defend any and all such suits and actions, and will execute a bond in such sum and in such securities as shall be approved by the said Rochester Aqueduct and Water Company, conditioned to indemnify and save harmless, as aforesaid, the said Rochester Aqueduct and Water Company, and for the faithful performance of this contract by the party of the second part; and the said party of the second part hereby agree that so much of the money due to them under and by virtue of this agreement as shall be considered necessary by the Rochester Aqueduct and Water Company, may be retained by the said party of the first part until all such suits or claims for damages, as aforesaid, shall have been settled, and evidence to that effect furnished to the satisfaction of the said company.

And the said party of the second part further agree that the engineer of the Rochester Aqueduct and Water Company may make alterations in the line, grade, plan, form, or dimensions of the work, or in the amount of pipe herein contemplated, either before or after the construction is commenced.

If such alterations diminish the quantity of work to be done, they shall not constitute a claim for damages, or for anticipated profits on the work that may be dispensed with; if they increase the amount of work, such increase shall be paid for according to the quantity actually done, and at the price established for such work under this contract. No claim for extra work shall be made unless the same shall be done in pursuance of a written order from the engineer, and all claims for extra work not made to the Rochester Aqueduct and Water Company in writing before the next succeeding estimate after the work was performed, shall be considered as abandoned by the contractor.

And the said party of the second part hereby agree to receive the following price as full compensation for furnishing all materials not found on the ground, (except the pipes and other castings, stop-gates, air-cocks, check-valves, and hydrants), and for all labor in moving material and executing all the work contemplated in this contract; also all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same; also for all expense incurred in consequence of any suspension or discontinuance of said work, and for well and faithfully completing the work, and the whole thereof, in the manner and according to the plans and specifications, and the requirements of the engineer under them, to wit:—

1. For all excavation in rock, including disposal of materials in spoil-banks, the sum of —— per cubic yard in excavation.

2. For inspecting all pipes, special castings, and other materials, hauling and distributing the same, all trenching, laying pipes, and all appurtenances, furnishing all materials and doing all labor necessary for the same, back-filling trench, crossing under railroad track, including all expenses incident thereto, hauling and setting all hydrants complete, furnishing and setting in place all wooden stop-gate and air-cock boxes, including the fitting and securing of all iron frames and covers,—meaning the price here named to be full compensation for all expense and cost of completing the work called for by these specifications, viz.:—

For all 12 inch pipe, the sum of — cents per lineal foot.
For all 10 inch pipe, the sum of — cents per lineal foot.
For all 8 inch pipe, the sum of — cents per lineal foot.
For all 6 inch pipe, the sum of — cents per lineal foot.

And the said party of the second part hereby further agree that the said party of the first part shall be and are hereby authorized to deduct and retain out of the money which may be due to the party of the second part, under this agreement, the sum of twenty-five dollars ($25.00) per day as liquidated damages for each and every day that the aforesaid work may be uncompleted over and beyond the time herein stipulated for its completion; provided, however, that the said Rochester Aqueduct and Water Company shall have the right to extend the time for the completion of the said work, if they shall decide to do so.

And it is further agreed by the parties of this contract that the engineer of the Rochester Aqueduct and Water Company shall make monthly estimates, as the work progresses, of the work done and the materials delivered, and the payments shall be made of eighty-five (85) per cent only of the amount of said monthly estimates.

And the said party of the second part do hereby further agree that they shall not be entitled to demand or receive payment for any portion of said work or materials, except in the manner set forth in this agreement, nor until each and all of the stipulations herein before mentioned are complied with, and the engineer shall have given his certificate to that effect, whereupon the party of the first part will, at the expiration of forty days after such completion and delivery of such certificate, pay, and it hereby binds itself to pay, to the said party of the second part, in current funds, the whole amount of the money accruing to the said party of the second part under this contract, excepting such sum or sums as may be lawfully retained under any of the provisions of this contract herein before set forth; provided, that nothing herein contained be construed to affect the right hereby reserved by the said Rochester Aqueduct and Water Company to reject the whole or any portion of said work, should said certificate be found or known to be inconsistent with the terms of this agreement, or otherwise improperly given.

In witness whereof, the parties have hereunto set their hands and seals, this twenty-first day of July, *anno domini* one thousand eight hundred and eighty-five.

(Signed) E. G. WALLACE, [L. S.]
CHAS. B. GAFNEY, [L. S.]
——— ———, [L. S.]
For Rochester Aqueduct and Water Company.

——— ———. [L. S.]

JNO. H. MATTHEWS, witness as to

——— ———.

KNOW ALL MEN BY THESE PRESENTS.

That we, —— —— and —— ——, of ———, in the county of ———, and state of ———, copartners under the firm name of ——— ———, are held and firmly bound unto the Rochester Aqueduct and Water Company duly existing under the laws of the state of New Hampshire, and having its place of business at Rochester, New Hampshire, in the sum of five thousand dollars ($5,000) lawful money of the United States of America, to be paid to the said Rochester Aqueduct and Water Company, or its certain attorneys, its successors and assigns, for which payment will and truly be made, we bind ourselves, our heirs, executors, and administrators, jointly and severally, firmly by these presents, sealed with our seals, dated the —— day of ———, in the year one thousand eight hundred and eighty-five.

Whereas, the said —— —— and —— —— have entered into a contract with the Rochester Aqueduct and Water Company aforesaid by the agreement hereof, bearing date the twenty-first day of July, one thousand eight hundred and eighty-five.

Now the condition of this obligation is such, that if the said —— —— and —— —— shall well and truly keep and perform all the terms and conditions of this contract on their part to be kept and performed, and shall indemnify and save harmless the said Rochester Aqueduct and Water Company, as therein stipulated, then this obligation shall be of no effect; otherwise it shall be in full force and virtue.

(Signed) ——— ———, [L. S.]
——— ———. [L. S.]

Signed and sealed in the presence of

——— ———.

CONTRACT AND SPECIFICATIONS

FOR CONSTRUCTING THE RESERVOIR, DAMS, GATE-CHAMBER, AND OTHER APPURTENANCES FOR THE ROCHESTER AQUEDUCT AND WATER COMPANY.

This agreement, made and concluded this —— day of ———, in the year one thousand eight hundred and eighty-five, between the Rochester Aqueduct and Water Company, a corporation existing by and under the laws of the state of New Hampshire, party of the first part, and —— —— of ———, in the state of ———, party of the second part.

Witnesseth, that the said party of the second part, for a full and valuable consideration, have agreed, and by these presents do agree, with the said party of the first part, and under a penalty expressed in the bond bearing even date with these presents, and hereunto annexed at ——— own proper cost and expense, in a good and workmanlike manner, and in accordance with the best of —— —— art and ability to do all work and furnish all materials called for by this agreement, in the manner and under the conditions herein specified, and in accordance with the plans and directions made and to be made from time to time as the work proceeds; and ——— agreed that the said Rochester Aqueduct and Water Company shall be and are hereby authorized to appoint, from time to time, such person or persons as they may deem proper to inspect the materials to be furnished and the work to be done under this agreement, and to see that they strictly correspond to these specifications hereinafter set forth.

To prevent disputes and litigation, it is further agreed by and between said parties to this contract, that the engineer shall in all cases determine the amount or the quantity of the several kinds of work which are to be paid for under this contract; and he shall decide all questions which may arise relative to the execution of this contract on the part of the contractor; and his estimate shall be final and conclusive.

SPECIFICATIONS.

1.—LOCATION.

The work is to be done in the town of Rochester, N. H., and upon lines and points indicated by the engineer.

2.—WORK TO BE DONE.

All pipes, special castings, and gates will be furnished to the contractor on board cars at Portsmouth, N. H., freight paid to Rochester by said Rochester Aqueduct and Water Company.

The cost of hauling, and all expense for tools, materials, and labor incurred in prosecuting the work to completion, shall be paid by the contractor; the contractor to receive pipe, special castings, and gates aboard the cars at Portsmouth, N. H., from the manufacturers, all breakage and shipment to be at contractor's risk, until the same is inspected, laid, and covered in trench, under supervision of the engineer.

3.—HOW FORMED.

The reservoir shall be formed by constructing embankments of masonry and earth across two branches of the "Hart" Brook Valley.

4.—CLEARING AND GRUBBING.

The site of the embankment shall be thoroughly grubbed, and all stumps, roots, stones, and loose soil and earth shall be removed down to rock, or to such a depth as the engineer shall direct.

All matter removed in grubbing or clearing shall be deposited in spoil-banks, convenient for future use, in the manner indicated by the engineer.

5.—EARTHWORK, HOW FORMED.

All embankments shall start from a well-prepared base, shall be free from all muck, stumps, roots, and all perishable material, and from stones more than three inches in diameter, and such stones shall not come in contact with each other, nor be placed in the inner slope.

6.—SLOPES.

All the banks shall have the inner and outer slopes one and one half base to one perpendicular; and the inner or water slope shall be covered with stone (riprap) to a uniform depth of eighteen inches; the banks, when finished, to be fifteen feet wide on top, exclusive of the soil on the outer slope. The outer slope and top shall be covered with good soil, one foot thick, and shall be trimmed to the form required, and to be well compacted by rolling, ramming, or both.

7.—BUILDING.

The embankment shall be carried up in layers not exceeding eight inches in thickness, slightly concave in cross-section, but level longitudinally. They shall be free from lumps, and to be thoroughly rolled with a heavy grooved roller, and well rammed at all points and places where the roller cannot be effectually used. The embankments shall be worked to their full width as they rise in height, and at same height on each side of core wall. If the engineer shall so direct, the earthwork shall be properly sprinkled with water before rolling or ramming.

8.—CORE WALL.

In the center of the embankment a core wall shall be built, extending from bed-rock, or from such earth foundation as shall be indicated by the engineer, to high-water line. It shall be four feet wide at the base, battering regularly to a width of one and one half feet at high-water line.

Said core wall shall be built of small stones (no stones extending through the work) laid full in thoroughly and freshly mixed hydraulic cement mortar, all joints to be as small as the nature of the stone will allow, and all spaces to be completely filled; the stones to be properly moistened before laying. The water side shall be plastered to a depth of one inch with said mortar, and said plastered surface shall be well covered and protected while setting, to prevent cracking, and whenever cracks do occur in the plastering, the work shall be replastered at expense of contractor.

No stones shall be hammered or broken upon the core wall or other masonry. The wall shall be carried up uniformly in all its parts, and not exceeding three feet in advance of the earthwork.

9.—CEMENT.

All cement furnished by the contractor for the work herein specified shall be subject to inspection and vigorous tests by the engineer, and if found of improper quality, shall be immediately removed from the work.

10.—MORTAR.

The same shall be clean, sharp, and free from loam, and shall be thoroughly mixed dry with the cement, in proportion of two parts sand to one part cement. The water shall be added in such quanity as to form a paste of the best quality, worked with proper tools and mixed fresh for the work.

11.—GATE-CHAMBER.

The masonry of the gate-chamber shall be built of block stone, laid in mortar above described, with joints not exceeding one half inch in thickness. The walls shall start from such foundation of rock or concrete and at such depths as the engineer shall direct, and be well bonded, laid to break joints sufficiently to make good, strong work, and shall be so placed as to present a fair and smooth surface wherever exposed, and the joints of such exposed surface shall be struck with neat cement mortar. The masonry shall be carried up uniformly with the other parts of the work.

GATES AND PIPES.

Special castings, pipes, and gates shall be set in the masonry of the gate-chamber as shown by the plans, or as directed by the engineer. The special castings, pipes, and gates shall be supported by concrete, puddle, and masonry, in accordance with the plans and such special directions as the engineer may give.

JOINTS.

All joints shall be of the best description in every respect, with gasket of clean, sound hemp, run in with pure lead, and well calked.

12.—DEFECTIVE MATERIAL.

No pipes, castings, or other material which is known to be defective, or which has been injured in handling, shall be used in the work. Notice shall always be given to the engineer or inspector of any such injured or defective pipe, gate, or casting; and if the same shall be found to have been laid, it shall be removed and replaced by sound and unobjectionable material by the contractor, without extra charge or loss to the said Rochester Aqueduct and Water Company.

13.—HANDLING.

Great care shall be exercised in handling all pipes, castings, gates, and other material, and the contractor shall be accountable for all loss resulting from breakage or other accident, after he receives the same from Portsmouth, N. H., from the manufacturer.

14.—GATE-HOUSE.

The gate-chamber shall be covered by a gate-house constructed of brick, with slated roof, and in accordance with the plans and directions of the engineer; and the screen-room or gate-chamber shall conform to plans and special directions furnished by said engineer.

15.—STAKES AND BENCH-MARKS.

All grades, dimensions, locations, and heights of the different kinds of work shall be designated by the proper stakes and bench-marks; and such stakes and bench-marks must be preserved in position until the prosecution of the work requires their removal. If the contractor or his servants willfully or carelessly remove any such bench-marks or stakes, the expense of replacing the same shall be charged to the contractor, and deducted from the amount due him on final settlement.

16.—CONCRETE.

All concrete shall be made of stone, broken so as to pass through a ring two inches in diameter inside, mixed with cement mortar as above described, and in such proportion as shall slightly overfill the spaces between the stones. No concrete or plastered surface shall be covered with the earthwork, until the concrete or mortar has become thoroughly hard.

17.—MEASUREMENTS.

All measurements shall be made by the engineer, or his assistants under his direction; and all material and workmanship shall be subject to the inspection and rejection of said engineer. All earthwork and rock-cutting shall be measured in excavation, except soiling the top and outer slope.

18.—DIRECTIONS.

All directions shall be given by the engineer or his authorized agents, and he shall have it in his power to make such changes in the form, dimensions, grades, and alignments of the work as the interest of the company may seem to him to require. The increased cost, if any, of such changes shall be determined by the engineer, and his finding shall be final. All the work contemplated and described in these specifications shall be done to the satisfaction of the engineer.

19.—INCOMPETENT WORKMEN.

If any workman employed by the contractor shall appear to the engineer to be incompetent, he shall, upon request of the engineer, be immediately discharged from the works, and shall not again be employed upon them.

20.—ORDER.

Whenever the contractor is not present upon any part of the work when it may be necessary to give orders or directions, such orders or directions may be given by the engineer or his assistants, and such orders and directions shall be received and obeyed by the superintendent or foreman of the particular work in which the directions are given.

21.—EXPLANATIONS AND CORRECTIONS.

The engineer shall decide as to the meaning and intent of any and all portions of these specifications, and he shall have the right to correct any error or omissions, when such correction is necessary for the proper fulfillment of their intention, the action of such correction to date from the time when the engineer gives notice thereof; and said engineer shall decide upon all matters of dispute between the contracting parties, and his decision, when in writing, shall be final.

22.—ENGINEER.

Whenever the word "Engineer" is used herein it shall be understood to refer to the engineer of the Rochester Aqueduct and Water Company, and his authorized agents, limited by the particular duties intrusted to them.

23.—CONTRACTOR.

Whenever the word "Contractor" is used herein it shall be understood to refer to the party, or parties, who have entered into the contract to perform the work to be done under these specifications, or the legal representative of such party.

24.—CONDITION OF COMPLETED WORK.

After the work is completed, the pipes, gates, and gate chamber and house shall be carefully swept and cleaned and left in a neat and smooth condition.

And it is further agreed that the work shall be commenced and carried on in such a manner, and at such times, as may from time to time be directed by the engineer.

And the said party of the second part hereby further agree that said party of the first part shall be and is hereby authorized to retain out of the money payable to said party of the second part, under the agreement, twenty per cent on the amount of the contract, and to expend in the manner hereinafter provided for in making such repairs of the work as the engineer may deem necessary. And it is further agreed that if at any time during six months of the date of the final completion of the work contemplated in this contract, any part of said work shall, in the opinion of the engineer, require repairing, and the engineer shall notify said party of the second part, in person or by mail, to make such repairs so required, and if said party of the second part shall neglect to commence to make such repairs to the satisfaction of the engineer within three days from the date of the service of said notice, then the said engineer shall have the right to employ such person or persons as he may deem proper to make the same, and said party of the first part shall pay the expense thereof out of the sum retained for that purpose by the party of the first part, as before mentioned.

And the said party of the first part hereby agree, upon the expiration of the said period of six months, provided that the work shall at that time be in good order, that the said party of the second part shall be entitled to receive such part of the sum last aforesaid mentioned as may remain after the expense of making such repairs, in the manner aforesaid, shall have been paid therefrom.

The said party of the second part further agree that ——— will give personal attention to the fulfillment of this contract, and that ——— will not sublet the aforesaid work, but will keep the same under ——— contract, and that ——— will not assign by power of attorney or otherwise, any portion of said work, unless by and with the consent of said Rochester Aqueduct and Water Company, such consent to be signified by indorsement on this agreement.

And the said party of the second part further agree that if the work to be done under this agreement shall be abandoned, or if the contract shall be assigned by the party of the second part otherwise than as herein specified, or if at any time the engineer shall be of the opinion, and shall so certify in writing to the said Rochester Aqueduct and Water Company, that the said work or any part thereof is unnecessarily or unreasonably delayed, or the said party of the second part are willfully violating any of the conditions or covenants of this contract, or are executing said contract in bad faith, the said Rochester Aqueduct and Water Company shall have the power to notify the aforesaid party of the second part to discontinue all work, or any part thereof, under this contract, and thereupon the said party of the second part shall discontinue said work or such part as the said Rochester Aqueduct and Water Company may designate; and the said Rochester Aqueduct and Water Company shall thereupon have the power to employ such or as many persons, and to obtain by purchase or hire such animals, carts, wagons, implements, and tools as the engineer may deem necessary or advisable, to work and to be used to complete the work herein described, or such part thereof as the engineer may deem necessary, and to use such materials as they may find upon the location of said work, and to procure other materials for the completion of the same, and to charge the expense of said labor, materials, animals, carts, wagons, implements, and tools to the party of the second part, and the expense so charged shall be deducted and paid by the party of the first part out of such money as may be either due or may become due at any time thereafter, to the said party of the second part under and by virtue of this agreement or any part thereof; and in case such expense is less than the sum which would have been payable under this contract, if the same had been completed by the party of the second part, the said party of the second part shall be entitled to the difference, and in case the expense shall exceed the last said sum, then the party of the second part shall pay the amount of such excess to the party of the first part.

The said party of the second part further agree that —— will indemnify and save harmless said Rochester Aqueduct and Water Company from all claims, demands, suits, and actions of every name and description, for or on account of any damages received or sustained by any party or parties, in their persons or property by or from the party of the second part, —— servants or agents, in the construction of the said work, or by or in consequence of any improper materials used in its construction, or by or in consequence of any negligence in grading the same, or by or in consequence of any act or omission of the said party of the second part, or —— servants or agents, and at —— own proper cost and expense defend any and all such suits and actions, and will execute a bond in such sum and such sureties as shall be approved by the said Rochester Aqueduct and Water Company, conditioned to indemnify and save the said company harmless, as aforesaid; and for the faithful performance of this contract by the party of the second part, the said party of the second part hereby agrees that so much of the money due to ——, under and by virtue of this agreement, as shall be considered necessary by said company, be retained by the said party of the first part until all such suits and claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of said company.

And the said party of the second part further agrees that the engineer of the said Rochester Aqueduct and Water Company may make alterations in the lines, grades, forms, or dimensions of the work either before or after the commencement thereof. If such alterations diminish the quantity of the work to be done, they shall not constitute a claim for damages or for anticipated profits on the work that may be dispensed with; if they increase the amount of the work, such increase shall be paid for according to the quantity actually done, and at the price established for such work under this contract.

No claim shall be made for extra work unless the same shall be done in pursuance of a written order from the engineer; all claims for extra work, not made and presented to the said Rochester Aqueduct and Water Company in writing before the next succeeding estimate after the work was performed, shall be considered as abandoned by the contractor.

And the said party of the second part hereby agrees to receive the following price as full compensation for furnishing all materials not found on the ground, except pipes, special castings, and gates, and for all labor in moving material and executing all work contemplated in this contract; also all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same; also for any expense incurred in consequence of any suspension or discontinuance of said work, and for well and faithfully completing the work and the whole thereof, in the manner and according to the plans and specifications and the requirements of the engineer under them, to wit:—

1. For all excavation of or foundation in rock, including disposing of materials in spoil-banks, the sum of ——— per cubic feet in excavation.

2. For all earthwork, the sum of ——— per cubic yard in excavation.

3. For soiling top and outer slope, the sum of ——— per cubic yard, in place.

4. For concrete masonry laid as required, including the furnishing of all materials, the sum of ——— per cubic yard.

5. For all brick masonry laid in hydraulic cement, including all materials and tools, the sum of ——— per cubic yard.

6. For hauling and setting in place all pipes, gates, and other fixtures for the screen and gate-chamber, the sum of ———.

7. For all riprap on the water-slope, the sum of ——— per cubic yard.

8. For all stone masonry of the gate-chamber, laid in hydraulic cement, as specified, including all material, the sum of ——— per cubic yard.

9. For the core wall laid in hydraulic cement, as specified, including the furnishing of all tools, forms, and materials, the sum of ——— per cubic yard.

10. For all windows, doors, and other woodwork, and putting the same in place, the sum of ———.

11. For furnishing and securing in place all wrought-iron work, the sum of ——— per pound.

12. For clearing and grubbing the sites for embankments, the sum of ——— per cubic yard.

13. For all paving, the sum of ——— per square yard.

And it is further agreed by the parties that the engineer of the Rochester Aqueduct and Water Company shall make monthly estimates of the work as it progresses, and payments for the same shall be made of eighty per cent only of the amount of such monthly estimates.

And the said party of the second part hereby further agree that ——— shall not be entitled to demand or receive payment of any portion of said work or material except in the manner set forth in this agreement, and until each and all the stipulations herein before mentioned are complied with, and the engineer shall have given the certificate to that effect, whereupon the party of the first part will, at the expiration of forty days after the completion and delivery of such certificate, pay and hereby binds itself to pay to said party of the second part under this contract, excepting such sum or sums as may be lawfully retained under any of the provisions of this contract herein before set forth; provided, that there is nothing herein contained to affect the right hereby reserved by the said Rochester Aqueduct and Water Company to reject the whole or any portion of said work, should said certificate be found or known to be inconsistent with the terms of this agreement, or otherwise improperly given.

In witness whereof, the said Rochester Aqueduct and Water Company has caused its seal to be affixed, and these presents to be signed by —— ——, —— ——, —— ——, the ——— thereunto duly authorized, and the said ha— hereunto set ——— hands and seals the day and year first above written.

Signed and sealed in the presence of

——— ———.

TYPHOID FEVER

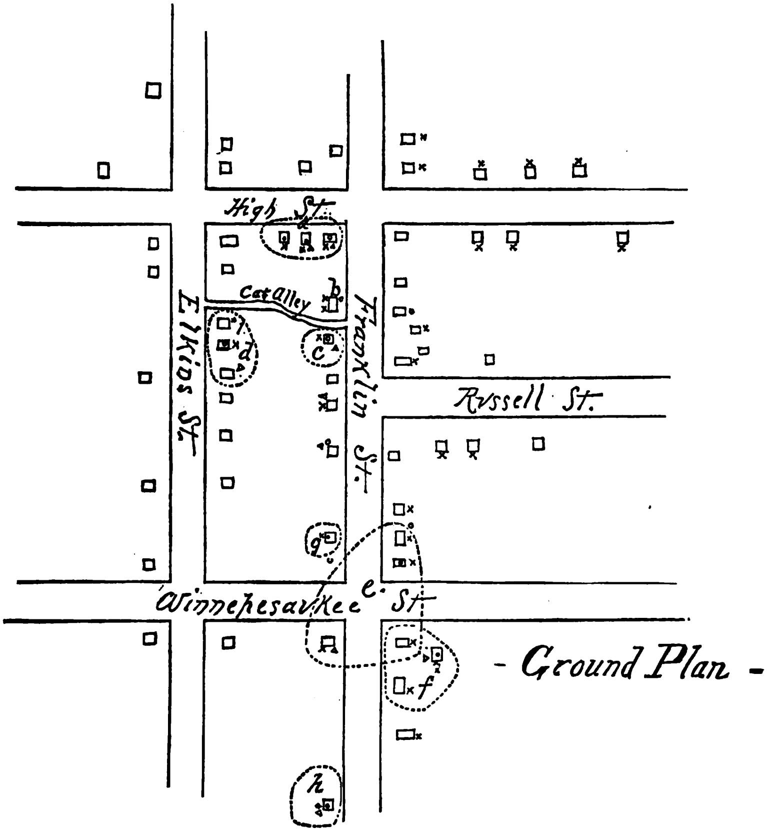
IN AN UNSANITARY LOCALITY IN FRANKLIN, N. H.

BY C. B. NICHOLS, M. D.

For the benefit of those who believe in the germ theory of typhoid fever, and for the study of those who do not, I wish to present the history of an epidemic of typhoid fever, which occurred in Franklin during the months of August, September, and October, 1885. The accompanying plate, showing a large portion of the area embraced by the epidemic, is inserted, believing that a sanitary description of this locality will go far toward proving the existence of a *contagium vivium* as a direct cause of the epidemic, and by so doing encourage the members of the medical profession throughout the state to bring their influence to bear upon the town authorities of their respective localities, to introduce a proper system of drainage and a sufficient quantity of *sanitary* water. It is a conceded fact that foulness of any kind, whether in air, water, or food, is a promoter of typhoid fever. Every physician is familiar with the oft-repeated history given by Dr. Flint in regard to the epidemic in the town of New Boston, New York.

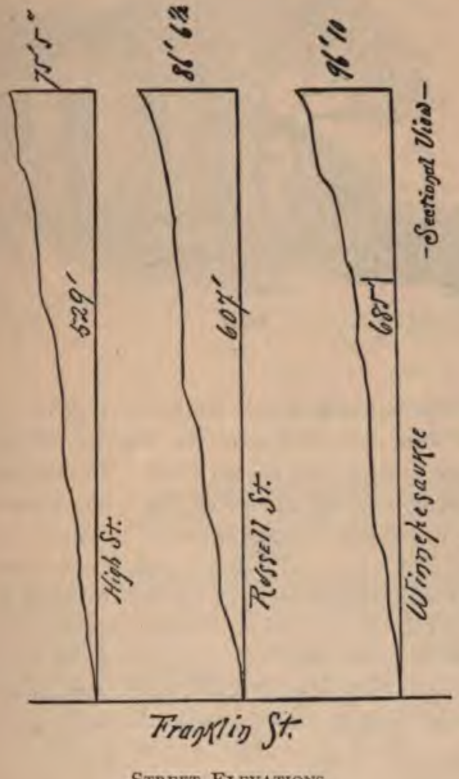
The history of the epidemic in Franklin points in no uncertain manner, and in no less direct way, toward the unsanitary condition of this locality as being the exciting cause of this epidemic, than does that of Dr. Flint toward the well in New Boston.

This locality embraces what was formerly known as the "Flat," being originally an old alder swamp, receiving the drainage from the sidehill, which rises to the height of about 100 feet, the rise



v—Cesspool. o—Well. x—Privy. a—Locality of house shown in Plate 1. b—Plate 2, house faces Franklin street. c—Plate 3, house faces Franklin street. d—Plate 4, house faces Elkins street. e—Plate 5, corners of Franklin and Winnipesaukee streets. f—Plate 6, three houses on southeast corner of Franklin and Winnipesaukee streets. g—Plate 7, house faces Franklin street. h—Three cases of typhoid fever, 1 of erysipelas, 3 of scarlet fever.

beginning parallel to the east side of Franklin street, which runs nearly north and south. This sidehill is filled with springs which furnish quite a steady supply of water with which to keep the low land wet most of the year. In past years, the place has been the receptacle for all sorts of filth, waste, and refuse matter; but as it became settled, many of the lower places have been filled in and graded up. On each side of the streets which run east—Russell, High, and Winnipesaukee—is a surface ditch, which, in reality, is the sewer, receiving the drainage from privies, pig-pens, hen-pens, cellars, and overflowing cesspools, which, in a majority of cases, are never cleaned out. This is carried down the three principal streets on the sidehill to the ditches of the same kind on Franklin street, thence carried along and spread out in the front and back yards of the houses on the "Flat." The soil, which is sand and loam in most of the localities, is very loose, and has furnished the very best material for



STREET ELEVATIONS.

becoming impregnated with all the foulness which has been flowing down these surface drains in the years past.

The accompanying plates show some of the worst places, also the houses where most of the typhoid fever occurred.

Plate 1.

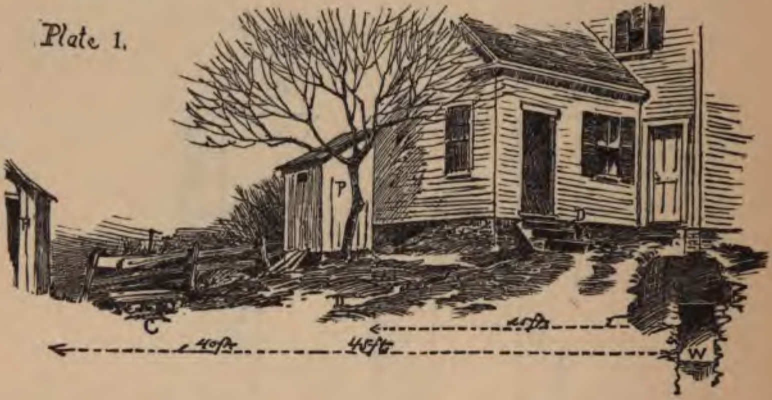


Plate 1 * represents the house where the epidemic started. In Figure 1, as seen, the privy is in the rear of the house, on the surface of the ground, and has no vault. The well is in the cellar, about twenty-five feet from and much lower than the privy. It has been the custom to throw all sorts of house slops out the back door. The soil is very sandy, and it can readily be seen how it is possible for the well to become infected with disease germs. For a long time before the fever appeared in the house the water was unfit to use, being obnoxious to both taste and smell. The following is an analysis of the water taken from the well the April following, together with the expert's opinion :—

Odor	None.
Color	Colorless.
Total solids, grains per gallon	14.1
Ignition of residue	Slight blackening.
Combustible and volatile matter	4.7
Hardness, equivalent to grains of $CaCO_3$	3.0
Alkalinity, " " " " "	Acid reaction.

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* The sketch shows too much fall of the ground.

Chlorine, grains per gallon	1.800
Ammonia, parts per million :—	
Free ammonia	.006
Albuminoid ammonia	.085
Nitric acid	Considerable.
Nitrous acid	None.
Iron	Very slight trace.
Lead	None.
Sediment (considerable from bottle)	Little.
Microscopic examination	Fresh water algæ.

The water does not appear bad microscopically. It is a little suspicious chemically, and will become worse as the season advances.

In August, G. G., aged 20, was taken sick with typhoid fever, confined to the bed till September 27; mild delirium one week; highest temperature, 105 2-5°; highest pulse, 130; recovered.

September 6, Nathan G., aged 61, took the bed with typhoid fever; remained in bed till November 2; muttering delirium four weeks; highest temperature, 105 4-5°; highest pulse, 140; lowest temperature, 98.8°; lowest pulse, 60; recovered.

Plate 2.

In an adjoining house occurred one case attended with severe diarrhea, and after two weeks resulted in death. By referring to the ground plan it will be seen that these two houses face on High street, near the corner of Franklin street, included in group *a*. By studying the ground plan, all the cases can be located,—18 in all.

Plate 2 shows the rear of *b* on the plan, also the head of what rejoices in the suggestive name of "Cat Alley." There are four privies in the shed, no vaults; receives the wash of the house, and overflow water stands on the surface of the ground nine months of the year. In this house there is sickness of some kind most of the time, embracing in the list, diphtheria, scarlet fever, erysipelas, and puerperal fever. These privies have not been cleaned out for an unknown period, the excrement and rubbish being exposed to view and sunlight at points marked 1, 2, 3, and 4.

Plate 3.

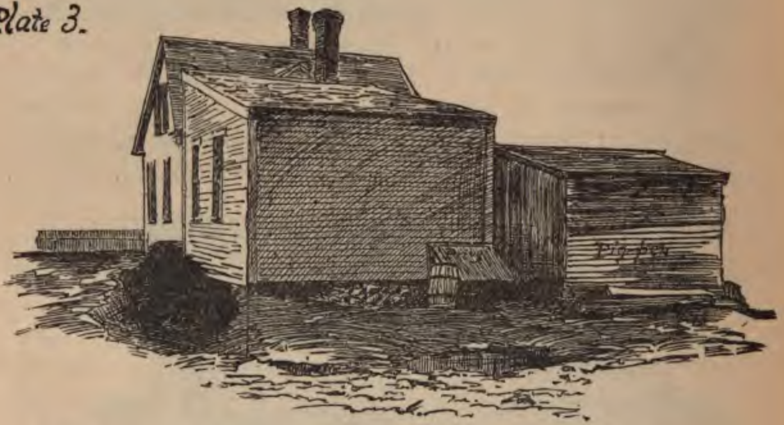


Plate 3 is the house which is marked *c* on ground plan, within a few feet of house marked *b*. This house was built on a "muck-hole"; the lot is lower than its surroundings; the well is in the cellar, as shown in the plate. Before the fever appeared, the water was foul and unfit for use; during the sickness in this family, the surface water ran into the cellar to a point near the well, into an excavation which the owner made for the purpose, and what did not soak into the ground and thus into the well was carried out in buckets and thrown on the ground, thence to find its way back into the well.

The record, as kindly furnished me by Dr. C. W. Adams, the attending physician, is as follows: C. B., aged 6 years, taken sick with typhoid fever August 28, 1885; sick twenty-eight days. Highest temperature first week, 104 2-5°; second week, 106 2-5°; third week, 106°. Highest pulse, 160 to 170. Largest number of stools in one day, 9, on the fifteenth day.

Mrs. B., aged 32, taken with typhoid fever September 23, sick thirty-seven days. Highest temperature first week, 104°; second week, 106°; third week, 107°; fourth week, 105°; fifth week, 104°. Severe diarrhea all the time. At the time of the highest temperature the pulse could not be counted. Complications: bronchitis from twenty-second to thirty-second day; œdema for three weeks.

Plate 4.

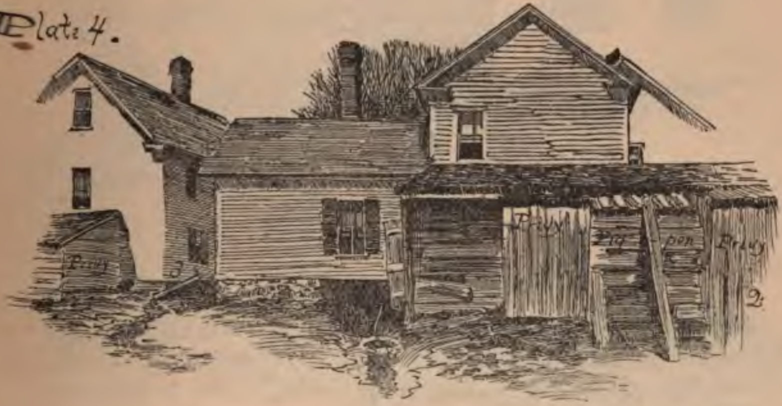


Plate 4 shows the buildings just in the rear of No. 3. Across the lot, at the point marked 1, fecal matter crowded out on to the surface of the ground, and stood in fermented pools. At the point marked 2 is another surface privy in the same condition. At the point marked 3 a sink-spout is seen, which discharges on the surface of the ground, and for a circle of fifteen feet the soil is thoroughly saturated, the water standing in large puddles, exposed to the sunlight. It is directly opposite the door in the L, which opens into the kitchen and dining-room of the house in the foreground.

Plates 5 and 6 represent three houses in which there were four cases of typhoid fever. The locality is at the corner of Winnipesaukee and Franklin streets. Plates 5 and 6 must be studied together, as they represent the same locality. Particular attention is called to Plate 6, the house marked A. B and C are privies; the light shading seen between the privies, C and B, represents

Plate 5.

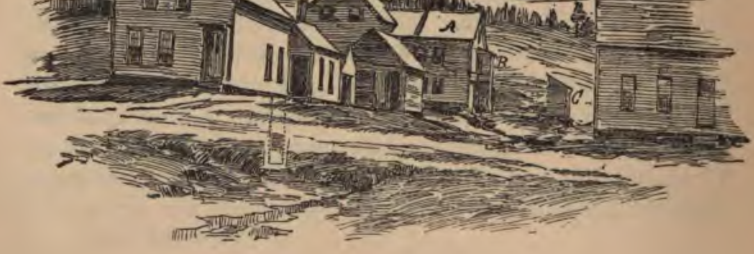
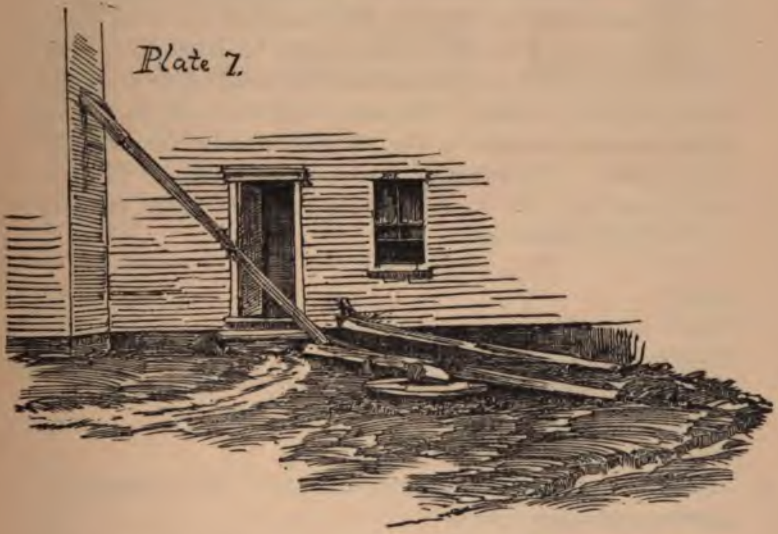


Plate 6.

water, running or standing on the surface of the ground, coming down through or under the road, and out, as shown in the plate, spreading out on the surface of the ground opposite a house shown on opposite side of street. This water comes directly through the privy marked C in Plate 6, and flows past and over the sink-drains and overflowing cesspools from the main house, A, Plate 6, in which live three large families. Fecal matter can be seen as it is carried down on the surface of the ground by the force of the water into the yards of the houses on each side; the land being low and the soil heavy the stagnant water stands for weeks fermenting in the heat and sunlight.



In adjacent houses, the privies are in the rear and on the surface; no vaults, and back of these, on the elevated land which is shown on the plate, there are numerous springs which boil up and run down the hill through privies into the street, and a great portion of the time water stands in the back yards of these houses. In a majority of these houses the well is in the cellar. At the point marked *g* on the plan, there were four cases of typhoid fever. The sanitary conditions are shown in Plate 7.

The distance from the well to the nearest sink-spout trough is from 8 to 10 feet; to the farthest trough, 12 to 14 feet; there is an open gutter from the termini of the troughs for about 25 feet.

In Plate 6, house A, the well is in the cellar, and it is a common occurrence for the tenants to hear the surface water as it comes down the hill and runs into the well. In this house it has been a difficult matter to keep tenants, on account of the sickness in the families. It has been the abiding place of diphtheria or some other zymotic trouble all the time.

Following is an analysis of the water taken from well in house 2, Plate 5, where occurred two cases of typhoid fever. During the time of the sickness, the sink-spout was stopped up and gave the family a great deal of trouble, on account of the water flowing into the cellar. The well is what might be termed a "surface well," as they told me it was not uncommon to pump it dry during an ordinary washing. The well is in the back part of the cellar, in close proximity to the low ground, which is not visible in the plate. The following analysis was made by the same expert, together with the opinion of the water taken from the well the April following:—

Odor	None.
Color	Colorless.
Total solids, grains per gallon	10.0
Ignition of residue	It blackens.
Combustible matter	4.0
Hardness, equivalent to grains of $CaCO_3$	3.2
Alkalinity, equivalent to grains of $CaCO_3$	Acid reaction.
Chlorine, grains per gallon	2.0
Ammonia, parts per million:—	
Free ammonia	0.010
Albuminoid ammonia	0.282
Nitric acid	Considerable.
Nitrous acid	None.
Iron	Strong trace.
Lead	None.
Sediment	Some.
Microscopic examination	Infusoria and bacteria.

The custom in this locality is to dig the well in the cellar, put the privy somewhere in the rear on the surface of the ground, within easy filtering distance of the well, and run the sink-spout into a barrel sunk into the ground, where it is left to fill up and become a source of infection.

The following is an analysis of water taken from house marked A, in Plate 6 :—

Odor	None.
Color	Slightly milky.
Total solids, grains per gallon	7.0
Ignition of residue	It does not blacken.
Combustible and volatile matter	2.7
Hardness, equivalent to grains of $CaCO_3$	2.7
Alkalinity, equivalent to grains of $CaCO_3$	Acid reaction.
Chlorine, grains per gallon	0.9
Ammonia, parts per million :—	
Free ammonia	0.012
Albuminoid ammonia	0.054
Nitric acid	Considerable.
Nitrous Acid	None.
Iron	Trace.
Lead	None.
Sediment	Slight.
Microscopic examination	Infusoria and bacteria.

OPINION.

The water is bad microscopically; it will become bad chemically as the season advances. In this locality there is not the least attention paid to sanitary laws, cleanliness, or regard for the feelings of their neighbors. In the warm season of the year gases are continually rising from innumerable sources of decomposition, infecting the atmosphere with microscopic germs of disease, and causing this to be one of the most unsanitary localities imaginable. There is not a month in the year when there is not a greater or less number of zymotic diseases present. It is very thickly settled, there being in many houses two, three, and sometimes four families. I have had occasion to attend quite a number of surgical cases in these families during the last five years, and all have had pyæmia or erysipelas. In one case of exsection of the elbow the patient had eleven abscesses. It seems to be the favorite hunting ground of typhoid fever, erysipelas, and the whole list of zymotic diseases. These disease germs are born here, and I suspect they will continue to be until the people and town authorities are convinced that their back yards are not the cleanest in the world, and that water which comes up through an infected soil is not pure; that proper drainage, good wholesome water, and cleanliness are the three great factors by which diseases are prevented; that prevention of disease is more economical than sickness. When the people are willing to assist the honest men of science, who are laboring for their good, instead of throwing every obstacle in their way possible; when town and state authorities can rise above the niggardly penuriousness and the political policy which shackles every officer's hands against doing his duty; when professional men and laymen alike will acknowledge the superiority of the microscope and chemistry over prejudice and bigotry, and those who do not know will show a willingness to be taught the great principles of hygiene,—then we shall be able to fight the dreaded germs of disease united and powerful.

The following analysis is of a specimen of water taken from a house farther up Franklin street,—one of what is supposed to be of a better class. The gentleman who owns it lives there, and flatters himself that at considerable expense he has provided his family with *pure water*. The well from which he takes the water is nearly at the top of the hill, a few feet to the north of High street (see chart):—

Odor	None.
Color	Colorless.
Total solids, grains per gallon	15.6
Ignition of residue	Slight blackening.
Combustible and volatile matter	6.4
Hardness, equivalent to grains of $CaCO_3$	3.0
Alkalinity, equivalent to grains of $CaCO_3$	Acid reaction.
Chlorine, grains per gallon	1.2

Ammonia, parts per million :—	
Free ammonia	0.016
Albuminoid ammonia	0.106
Nitric acid	Much.
Nitrous acid	Little.
Iron	Weak trace.
Lead	None.
Sediment	Some.
Microscopic examination	Bacteria, many.

OPINION.

The specimen is very bad microscopically and chemically. It is very suspicious. It is not safe to drink in its present condition, it being perfectly alive with bacteria. The following is the opinion of Prof. Angell, who made the analyses, in regard to the specimens of water taken from the different localities of the infected district:—

1. The specimens seemed to have no odor. In one or two cases the stopper of the bottle had imparted a slight odor, which might have obscured the odor of the water if it had any.

2. Specimen No. 2 had a slight milky color. This is generally an unfavorable sign; it points to the presence of bacteria. The other specimens were clear, excepting near the sediment.

3. The total solids not large in any case.

4. The ignition of the residue showed a marked blackening in specimen No. 1; in Nos. 3 and 4 it was very slight; in No. 2 there was no blackening. Blackening shows the presence of organic matter. It will be noticed that, as a rule, the degree of blackening corresponds to the amount of albuminoid ammonia.

5. The appearance of the residue before ignition is often characteristic. The residue of specimen No. 1 was in waves and patches with many spots and flakes resembling dried scum. This is an indication of organic matter. The residue of the other specimens was even and of uniform appearance.

6. The combustible and volatile matter is large in each case. It will always be in proportion to the amount of organic matter. It varies also according to the amount of volatile mineral salts,

such as carbonate of ammonia and the nitrates. In these four cases it is largely due to nitrates.

7. The hardness is not great.

8. The reaction of the water in each case is acid; water is usually alkaline. The acidity in these cases is to be regarded unfavorably, as it results from acids formed from the decomposition of organic matter.

9. The amount of chlorine is in excess.

10. The amount of free ammonia is small in each case. Free ammonia in water results from the decomposition of organic matter, and is largest in amount when such decomposition is most active. It easily escapes, and may exist in small amount when it is being formed largely, i. e., when much decay is going on, because the iron contained in water precipitates it, and under some circumstances it is quickly oxidized to nitric acid. In these cases the free ammonia has been oxidized to form nitric acid evidently. Its small amount is partly due to the fact that the season is not advanced enough to hasten decay and to bring in organic matter to decay. The following remark applies also to the following subject: During the winter polluting matter could not find ready access to the well, and there have been no great rains lately to wash foul matter into the well, so that really the water makes its best possible showing at this time. A few weeks later, especially if we have rains, the water will become very bad in each of these four cases.

11. The albuminoid ammonia is in excess in Nos. 1 and 3; it is very small in No. 2. Albuminoid ammonia measures the amount of organic matter in water. Animal matter produces a larger proportion of it than vegetable matter.

12. Nitric acid is present in every sample in excess; it was formed from animal matter. Its presence is a sure sign that the water is either polluted with animal matter, or has been or will be so polluted. In specimen No. 2 it is the only unfavorable sign except the slight milky color. In this case it declares that the water has been polluted, and, other things being equal, will be polluted again with animal matter.

13. The same remarks apply to nitrous acid, only the decomposition that produced it is more recent, it being a lower oxide and consequently less time required for its formation.

14. Iron always occurs in small quantities in water, and is objectionable only when in excess.

15. These specimens are free from lead.

16. The sediment is not large in these samples; the water near the sediment in every case but one, No. 4, had a milky appearance.

17. These waters at present contain infusoria and bacteria, except No. 4. As the season advances they will contain more. Many waters that are safe to drink contain infusoria, but if a water contains bacteria it should be condemned. Of these specimens No. 3 shows the most bacteria; the sediment is alive with them. A water may appear to be good chemically, and the microscope may show it to be bad. Specimen No. 1 is very bad water, both chemically and microscopically.

Besides the suffering caused by this disregard of all sanitary laws, the moneyed value of the epidemic is something worthy of consideration, and to my mind furnishes a reason why the people should insist on the sanitary laws being carried out. The total expense for the eighteen cases of typhoid fever, two cases of diphtheria, three cases of scarlet fever, and one case of erysipelas, covering a period of three months, was $7,215, counting the four deaths at $1,000 each, which I believe is the law. The individual expenses are as follows, the figures being given me by members of the families, and many times taken from the bills:—

No. 1	$805.00	No. 7	$225.00
No. 2	100.00	No. 8	225.00
No. 3	485.00	No. 9	325.00
No. 4	500.00	No. 10 . . .	50.00
No. 5	300.00	No. 11 . . .	150.00
No. 6	50.00		

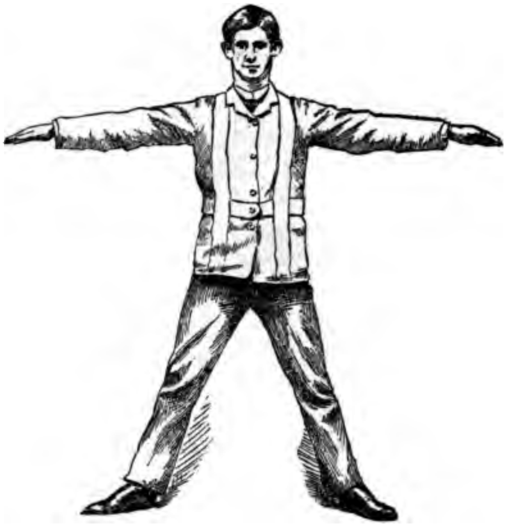
PHYSICAL EXERCISE.

BY CARL H. HORSCH, M. D., DOVER, N. H.

A well-regulated use of our voluntary muscles is a very important aid for the functions of digestion and assimilation of the food, circulation and mixing of the blood, growth, production and reproduction of our system.

The circulation in the veins, wherein the blood is carried from the parts of the body back to the heart, is influenced to a great extent by the contraction of the muscle fibers. If the fibers of our muscles contract, a pressure against the surrounding vessels takes place and the blood is pushed towards the heart. The valves which we find in the veins prevent the blood from flowing back again when the contraction ceases, a next contraction brings the blood still nearer and at a certain time back to the heart. Gaskell and others have demonstrated by experiments that the flow of blood through the muscles is increased during the period of contraction. For that part of the circulation of the blood, systematic free exercises are the most effectual, and in order to carry them out systematically we must know what different motions the muscles produce.

If we commence with the here illustrated motions, we are sure that we have brought the voluntary muscles which can be entirely controlled by our will, into rational systematic physiological action, and have them better prepared for daily labor, forced muscular exercises, as gymnastics, boating, etc., for a better balance of our body, and for a development of agility and vigor. The following illustrated exercises should be made at least three times a day, and every motion three times, which can be executed in about two minutes. There are many vocations where persons use or even overtax some of their voluntary muscles, but do not contract the fibers of the other sets of muscles, which the circulation of the blood and other physiological functions require.

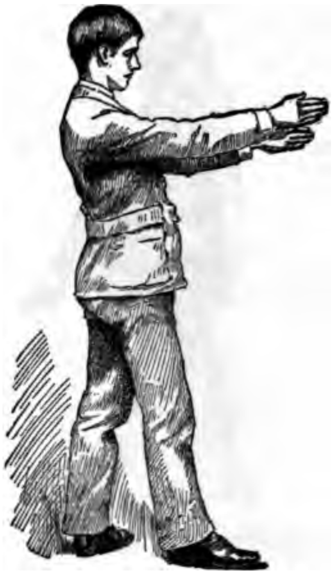


No. 1.—Exercise for the Abductor Muscles.

1. Use the abductor muscles by spreading the extremities, and move them from the middle line of the body.

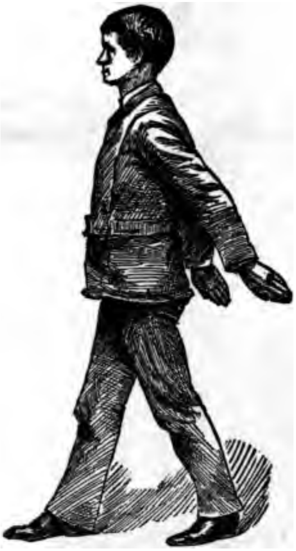
NO. 2.—EXERCISE FOR THE ADDUCTOR MUSCLES.

2. The adductor muscles are well used by drawing the limbs as close as possible to the middle line of the body; you can do it after each abduction, but it is better to draw the limbs close to the body by separate motions, and when the extremities are about one inch from the body.



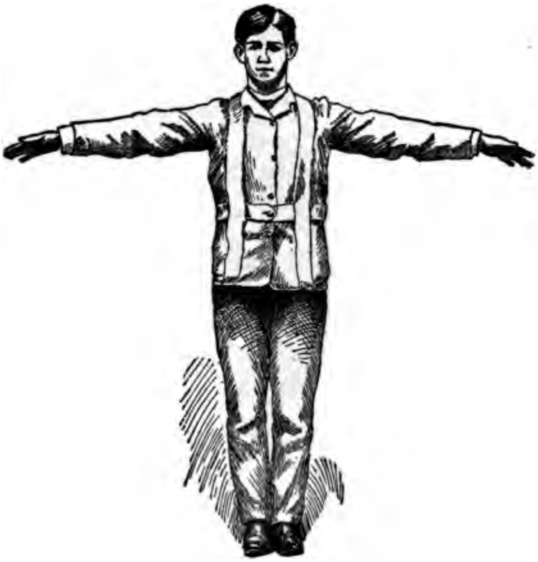
No. 3.—Exercise for the Attraction Muscles.

3. Attraction muscles are used by making a step forward, and with every step throwing the arms forward.



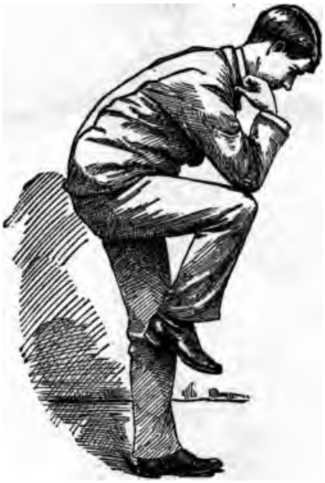
No. 4.—Exercise for the Retraction Muscles.

4. Retraction muscles by stepping backward, and with every step throwing the arms backward.



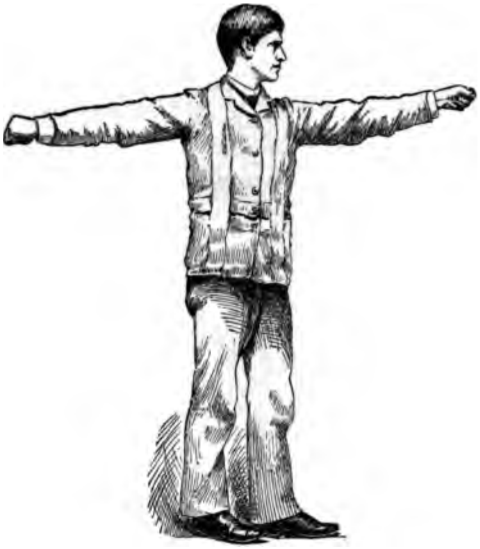
No. 5.—Exercise for the Extensor Muscles.

5. Use the extensor muscles by stretching the body, the right arm and leg, then the left arm and leg.



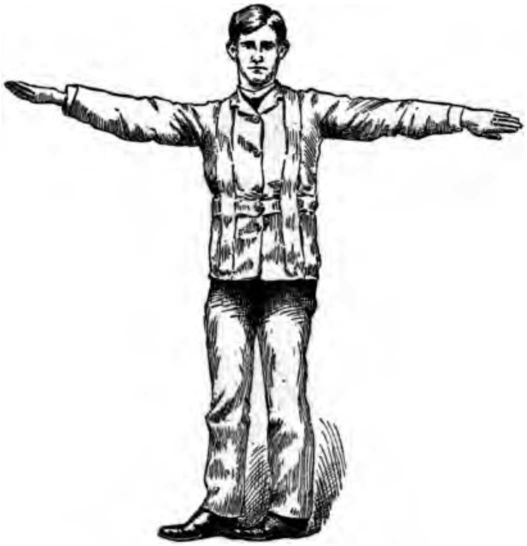
No. 6.—Exercise for the Flexor Muscles.

6. The flexor muscles by bending body, neck, right arm and leg, then left arm and leg.



No. 7.—Exercise for the Rotator Muscles.

7. Rotator muscles by throwing the head as much as possible to the right and then to the left, and turn the arms and then the legs on their axes.



Nos. 8 and 9.—Exercise for the Pronator and Supinator Muscles.

8. The actions of the pronator and supinator muscles are illustrated on one figure ; you find the right hand pronated and the left supinated ; first exercise hand and wrist, then feet and ankles.

9. Depressor muscles, which draw the lower lip, the angle of the mouth, and the side of the nose down.

To stretch and bend our arms and legs would not be a sufficient physical exercise for a normal circulation in these extremities, because the rotator muscles, pronators, and the supinators must also be brought into action for that purpose.

Breathing is accelerated by proper exercise of the voluntary muscles, and, therefore, we have a more appropriate exchange of oxygen, carbonic acid, and water.

The heart beats more frequently and forcibly during moderately energetic, regulated exercise, and the blood and its nourishing constituents are better distributed.

The digestion and the appetite are improved by physical exercise, on account of the increased waste, more rapid absorption, and greater demand of food; but as there is an increased flow of blood to the stomach during digestion, in order to supply more gastric juice, exercise right after a meal interferes with that process.

Systematic exercise gives also tone to the nervous system. Outdoor exercise gives us better air, more light, and a different pressure of the atmosphere than our buildings contain. Out of town exercise is beneficial, as we breathe no impurities which are floating in the air in thickly settled places.

Swedish gymnastics, or so called "movement cure," is an effort to produce more active contraction of the voluntary muscles and improve the nutrition of the same. Every school ought to have a properly arranged place and apparatus for gymnastics, and for free exercises of all the voluntary muscles, then the teachers and scholars can improve their physical conditions, and have systematic means by which the body will be developed to better usefulness and symmetry.

The present "rough and tumble sports" are more likely to be injurious. Erasmus Wilson says: "In mind lies the great secret of beneficial exercise, and without it exercise is a misnomer and a fraud on the constitution." When mental culture and physical education are going hand in hand, various crippled conditions and diseases may be prevented, and a more vigorous people will exist.

There are already a number of educational institutions where physical education is taught, and also gymnastic institutions, athletic clubs,—the German *Turnverein* and the American *Turnerbund*.

APPENDIX.

APPENDIX.

SANITARY LAWS PASSED BY THE LEGISLATURE OF 1885.

AN ACT TO RENDER MORE EFFICIENT THE HEALTH LAWS OF THE STATE.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. The selectmen of any town that has neglected to elect a health officer or officers may appoint one or more health officers for said town, as in the judgment of the selectmen may be necessary; but if no health officer or officers shall have been elected or appointed, it shall, upon the petition of ten or more legal voters, be the duty of the selectmen to appoint one or more health officers, as in their judgment may be necessary.

SECT. 2. The state board of health may make, in addition to the rules and regulations of local health officers, such other rules and regulations or may make such amendments to existing rules and regulations as, in the judgment of the board, the public good may demand, and such rules and regulations shall be enforced by the health officers in the same manner as other health regulations.

SECT. 3. Health officers or local boards of health shall furnish the state board of health with such information as may be called for from time to time concerning the work of such health officers or local boards of health, and a copy of all rules and regulations issued by such health officers or local boards of health shall be forwarded to the state board of health when issued.

SECT. 4. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

SECT. 5. This act shall take effect upon its passage.

[Approved July 23, 1885.]

AN ACT REGULATING THE SALE OF VEAL.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. If any person kills, or causes to be killed, for the purpose of sale, any calf less than four weeks old, or knowingly sells or has in possession with intent to sell for food, the meat of any calf killed when less than four weeks old, he shall be punished by imprisonment in jail not exceeding thirty days, or by fine not exceeding fifty dollars, or both; and all such meat exposed for sale, or kept with intent to sell, may be seized and destroyed by any board of health, health officer, or any sheriff, deputy sheriff, constable, or police officer.

SECT. 2. This act shall take effect on its passage.

[Approved August 12, 1885.]

AN ACT IN AMENDMENT OF SECTION 10, CHAPTER 42 OF THE PAMPHLET LAWS OF 1883, BEING AN ACT TO REGULATE THE SALE AND INSPECTION OF MILK.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. That section 10 of chapter 42 of the laws passed June session, 1883, be amended by adding at the end of said section the following: "But this provision shall not be construed to prevent any person from making complaint and instituting and carrying on prosecutions for the violation of any of said provisions, and such complainant, whether a town or city by its officers, or an individual, shall be entitled to one half of every fine collected through prosecution; and in any town where no inspector has been appointed complaints may be made to the state board of health, and said board shall proceed with such complaint in the same manner as is required of an inspector, whether the town from which complaint is made has or has not adopted the provisions of this act," so that said section shall read: "It shall be the duty of every inspector to institute a complaint for a violation of any of the provisions of this act on the information of any person who lays before him satisfactory evidence by which to sustain such complaint; but this provision shall not be construed to prevent any person from making complaint and instituting and carrying on prosecutions for the violation of any of said provisions; and such complainant, whether a town or city by its officers, or an individual, shall be entitled to one half of every fine collected through such prosecutions; and in any town where no inspector has been appointed complaints may be made to the state board of health, and said board shall proceed with such complaint in the same manner as required of an inspector, whether the town from which complaint is made has or has not adopted the provisions of this act."

SECT. 2. This act shall take effect upon its passage.

[Approved August 13, 1885.]

AN ACT TO PROHIBIT THE USE OF BARBED WIRE FENCES IN CERTAIN CASES.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. If the owner or occupant of any land adjoining land owned or occupied by any town or school district for school purposes, erects, keeps, or maintains any barbed wire fence, to separate or divide said lands, he shall be fined not exceeding twenty-five dollars.

SECT. 2. The selectmen of every town, and prudential committee of every school district, shall prosecute, at the expense of the town or district, as the case may be, any violation of the previous section.

[Approved August 19, 1885.]

AN ACT TO PROHIBIT THE SALE OF CIGARETTES OR TOBACCO IN ANY OF ITS FORMS TO MINORS.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. No person shall knowingly sell any cigarette, or tobacco in any of its forms, to any minor under sixteen years of age.

SECT. 2. If any person shall violate the provisions of this act, he shall be liable to a fine of twenty dollars for each and every such offense, such penalty or fine to go to the county treasurer for the use of the county wherein the violation of this act occurs.

[Approved August 25, 1885.]

AN ACT RELATING TO THE SALE OF IMITATION BUTTER.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. Whoever, by himself or his agent, shall sell, expose for sale, or have in his possession with intent to sell, any article or compound made in imitation of butter or as a substitute for butter, and not wholly made from milk or cream, and that is of any other color than pink, shall, for every package that he or they sells or exposes for sale, forfeit and pay a fine of fifty dollars; and for a second and each subsequent offense a fine of one hundred dollars, to be recovered with costs in any court of this state of competent jurisdiction; and any fine so recovered and paid shall go one half to the complainant and one half to the county where the offense was committed.

SECT. 2. The complainant in any action brought under section 1 of this act, or the health officers of any city or town, may cause specimens of suspected butter to be analyzed or otherwise satisfactorily tested as to color and compounds; and a certificate of the analysis, sworn to by the analyzer, shall be admitted in evidence in all prosecutions under this act. The expense of such analysis or test, not exceeding twenty dollars in any one case, may be included in the costs of prosecutions in all cases prosecuted under this act.

SECT. 3. For the purpose of this act the term butter shall be understood to mean the product usually known by that name and which is manufactured exclusively from milk or cream, or both, with salt, and with or without coloring matter.

SECT. 4. This act shall take effect upon its passage.

[Approved August 26, 1885.]

AN ACT TO SIMPLIFY THE PROCESS FOR PROTECTING CERTAIN WATER RIGHTS AND THE RIGHTS OF RIPARIAN PROPRIETORS.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. Any legal right, public or private, infringed by a change in the water level of any natural lake or pond, and the water rights of riparian proprietors on any stream, may be ascertained and enforced in a constitutional manner on a bill in equity without ascertainment of the right by a suit at law, and rights of boating, fishing, and navigation may be enforced on a bill in equity brought by the attorney-general in the name of the state.

SECT. 2. Any legal right, public or private, infringed by sawdust or other waste of a saw-mill or other lumber mill, cast or dropped into a water-course, or any other material cast or dropped into a water-course, may be enforced by the first section of this act.

[Approved August 28, 1885.]

AN ACT IN AMENDMENT OF AND IN ADDITION TO CHAPTER 100 OF THE PAMPHLET LAWS PASSED JUNE SESSION, 1881, ENTITLED "AN ACT FOR THE INSPECTION AND LICENSING OF STEAMBOATS AND THEIR ENGINEERS."

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. Sections 1 and 2 of chapter 100 of the Pamphlet Laws passed June session, 1881, are hereby amended by striking out the words "for the carriage of passengers for hire" in the third and fourth lines of section 1, and the same words in the second line of section 2, and insert in place thereof the words "for carrying passengers."

SECT. 2. Sections 1, 2, and 3 of said act are amended by inserting after the word "engineer," wherever it occurs, the words "or pilot."

SECT. 3. All engineers and pilots shall be examined as provided in said act, under oath, by said inspectors, who shall have power to administer an oath.

SECT. 4. If any person shall act as engineer or pilot on any steamboat, without the certificate herein provided for, or if any engineer or pilot shall, during the year for which he is licensed, neglect the duties of his office, or be of intemperate habits, or willfully violate any of the rules and regulations established by the inspector; or if any engineer shall carry more steam than the certificate for his boat allows, or shall in any way or manner interfere with the locked safety-valve of the boiler, after the same is set by the inspector, so as to allow greater pressure in the boiler than the amount specified by said certificate, his license may be suspended or revoked by the inspector, and he shall be punished by fine not exceeding one hundred dollars, or by imprisonment not exceeding one year, or by both.

SECT. 5. If any steamboat licensed as aforesaid shall, during the period of its license, be deemed by the inspector unsafe in its hull, or defective in its engine, boilers, or machinery, or its owners or lessees shall not have complied with the rules and regulations prescribed by the inspector, he shall have power to stop and detain such boat until the necessary repairs are made, or said rules and regulations are complied with.

SECT. 6. Said inspector shall examine such boat, its boiler and engines, to see if the provisions of this act and the rules and regulations established by the inspector have been complied with, not more than three times in each year, at such times as the inspector shall deem the public interests and safety require, and be paid therefor the same compensation now provided by law; his accounts for the same to be audited by the governor and council, and the governor shall draw his warrant on the treasurer therefor.

SECT. 7. If the owners or lessees of any steamboat licensed as aforesaid shall carry more passengers than its certificate allows, they shall be fined twenty-five dollars for each passenger carried in excess of the number so allowed.

SECT. 8. Every inspector of steamboats who, upon any pretense, receives any fee or reward for his services, except what is allowed to him by law, shall forfeit his office, and be otherwise punished by a fine of not more than five hundred dollars, or by imprisonment of not more than six months, or by both.

[Approved August 28, 1885.]

AN ACT IN AMENDMENT OF SECTION 1, CHAPTER 53 OF THE LAWS OF 1883, ENTITLED "AN ACT IN AMENDMENT OF SECTION 9, CHAPTER 111 OF THE GENERAL LAWS, RELATING TO THE PENALTY IN CERTAIN CASES OF NUISANCE."

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. That section 1 of chapter 53 of the laws of 1883, entitled an act in amendment of section 9 of chapter 111 of the General Laws, relating to

[illegible] be amended by adding thereto
[illegible] leave, or caused to be placed or
[illegible] lake or pond, or stream tributary
[illegible] or in part, of any city, town, or
[illegible] may cause the water thereof to be-
[illegible] is intended, such person shall be
[illegible] or by imprisonment not exceed-
[illegible] the peace is authorized to hear and
[illegible] and to render judgments in
[illegible] similar manner as in other criminal
[illegible] to serve any process in proceedings
[illegible] of health or water commission may re-
[illegible] rendering the water in such lake or
[illegible] or unfit for use as aforesaid, and
[illegible] from the person who placed or caused
[illegible] the water as aforesaid, in an action on the
[illegible] shall read as follows: “Section 1.
[illegible] by striking out the word ‘fifty’ (see
[illegible] the word ‘twenty,’ so that the sec-
[illegible] If any person shall place or leave, or
[illegible] any highway, street, alley, public place,
[illegible] unburied any animal, or other substance
[illegible] injurious to the public health, he shall
[illegible] dollars, to be recovered by the health
[illegible] the health officers shall remove the same;
[illegible] or cause to be placed or left, any substance
[illegible] pond, or stream tributary thereto, from which
[illegible] of any city, town, or village is taken for
[illegible] the water thereof to become impure or unfit
[illegible] such person shall be punished by a fine
[illegible] imprisonment not exceeding thirty days,
[illegible] peace is authorized to hear and determine
[illegible] and render judgments in proceedings
[illegible] similar manner as in other criminal proceed-
[illegible] to serve any process in proceedings pro-
[illegible] of health or water commission may re-
[illegible] as are rendering the water in such lake or
[illegible] impure or unfit for use, as aforesaid, and may
[illegible] from the person who placed, or caused to
[illegible] the water, as aforesaid, in an action on the

[illegible]

AN ACT FOR THE BETTER PROTECTION OF LIFE AND PROPERTY.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. No person shall transport or have in his possession for the purpose of transporting in any public conveyance, nor shall any person leave, deposit, or have in his possession in any dwelling-house, shop, or manufactory, dynamite, giant powder, nitro-glycerine, or any explosive compound of which nitro-glycerine forms a part. Any violation of this act shall be punished by a fine of not more than five hundred dollars nor less than one hundred dollars.

[Approved August 29, 1885.]

JOINT RESOLUTION ESTABLISHING AN EPIDEMIC FUND.

Resolved by the Senate and House of Representatives in General Court convened:

That the sum of five thousand dollars is hereby appropriated as an epidemic fund, to be used, if necessary, under the direction of the governor and council, in case of the invasion or threatened invasion of cholera or other epidemic disease in this state; and the governor is hereby authorized to draw his warrant for the same, or such part of the same as may be needed, out of any money in the treasury not otherwise appropriated.

[Approved August 28, 1885.]

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